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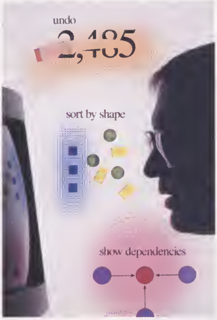

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STAFF LETTER

NEWS ABOUT 'START HERE' AND OTHER ITEMS

When you complain, we listen. And one complaint we have taken to heart is that there are not enough articles aimed at beginners.

So in this issue, we introduce a new monthly column called Start Here, for neophyte users of *1-2-3*. The first installment, on page 20, assumes only that you have installed the program and know how to load it. It tells you how to navigate around the worksheet and how to set up a simple calculation.

The next installment will pick up from there. If you collect these columns, you will eventually have a good training course for new users. If you taught yourself *1-2-3*, as many of us did, you may want to read even the early columns. You'll probably learn things about *1-2-3* you didn't know.

Actually, we try to keep beginners in mind all the time. The problems that beginners encounter with printers is a big reason we decided to publish a special report in this issue called Printing Worksheets.

Print problems account for a significant proportion of the letters we get and of the calls that go to the product support people at Lotus Development Corp. You don't have to be a beginner to need help with printing. New printers and plotters often require new setup strings, and the documentation is not always clear. Working with a laser printer can be especially frustrating. Now that new products such as *Allways* make fancier printouts possible, there's pressure to meet a new standard of presentation.

In this month's report, we help you think about types of printers, update our previous lists of setup strings and printer drivers, show you how to store print settings in macros, and list some of the most popular printer utilities. Most important, perhaps, we lay out the fundamentals of working with a laser printer.

A couple of other notes about this month's issue:

First, you won't find a department named Finance, Accounting, or Forecasting. We've dropped the department names, but not the coverage. Articles on those topics will now run in our Features section. We have no plans to cut back on such coverage, and with some future design changes, we will make it easy for regular readers to find those articles in a hurry.

Second, you will find in this issue a comparative review of two word processors, *WordPerfect* and *Lotus Manuscript*. We chose *WordPerfect* because more of you use it—by a wide margin—than use any other. We chose *Manuscript* because it has unusual ability to pull in data directly from a worksheet and to produce the highly structured documents that are so common in business.

In the past, we avoided head-to-head comparisons involving a product from our parent company because we felt that you might interpret favorable comments about it—even by an outside reviewer—as an unfair plug. We have decided not to worry about that any more. It's more important ,that we be useful.

John B. Campbell
Editorial Director

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LETTERS

PROBABILITY MADE SIMPLER

Editor's note: *Brian P. Hotaling, from Chemical Bank in New York, wrote to point out that the worksheet described in "Is It a Fluke?" (December) could be modified so that it wouldn't require recreating a data table (in* Symphony, *what-if table) every time you change the input. With this modification, the worksheet would also not require the complex formulas in the Scratchpad section. Because space does not permit us to print the entire suggestion, we offer a modified version:*

For a given number of trials (n) and a given probability of success (P), the probability that the number of successes (R) equals exactly zero is the probability of failure (that is, $1-P$) raised to the power of the number of trials. Furthermore, the probabilities associated with subsequent values of R are determined in the following formula:

$$\text{Probability of } R-1 \text{ successes } \times \frac{P\times(n-R+1)}{R\times(1-P)}$$

To modify the spreadsheet in the article, first erase range A9..D13 and cell G7. In cell G8 enter the formula (1−D6) ^ D5. In cell G9 enter the following formula:

```
+G8*D$6*(D$5-F9+1)/
  (F9*(1-D$6))
```

Copy cell G9 to range G10..G33. Then enter the following formula in cell D17:

```
@INDEX(G8..G33,0,D4)
```

Note that in the original version of the worksheet, you can set up just the section in columns A through D and compute the probability of exactly R successes. In the modified version, the formula in cell D17 depends on the values in column G, so you must enter the formulas in columns F and G in order to make the spreadsheet work. This method will not work in *1-2-3* Release 1A, which does not have the @INDEX function.

SWITCH TO SYMPHONY

Your survey results [December] pointed out the *1-2-3* features that users like least. All of these items can be remedied, though not necessarily without expense.

1-2-3 users should switch to *Symphony* to eliminate database and data-command limitations. The two products have a similar basis. If people understood their differences, limitations, and strengths, more might choose *Symphony* over its "little brother." Lotus Development Corp. should consider an upgrade from *1-2-3* to *Symphony* similar to new-release upgrades.

Hardware upgrades that include a high-resolution EGA monitor and a 640-by-480-pixel EGA autoswitch card will improve the graphics display.

Importing a spreadsheet print file and a graph file to *WordPerfect* Version 5.0 will allow integrated printing.

Raymond L. Myers
Hewitt, Tex

WHAT ABOUT MANUSCRIPT?

As a new subscriber to *LOTUS*, I have been pleased with your support for *1-2-3* and *Symphony*. Assuming you intend to support other Lotus products in future issues, I would like to suggest a section on *Lotus Manuscript*. Having used two other word processors (*WordStar* 3.3 and *WordPerfect* 4.2–5.0), I've found *Manuscript* 2.0 to be the true "document processor." Just try doing the following with the others:

$$\nabla_{32^\circ} = \int_{x'\to 0}^{\infty} (x^{0.5} - c)\,\partial x$$

Joseph R Cuneo
Port Clinton, Ohio

Editor's note: *Our current policy is to concentrate our resources, which are limited, on serving users of the two spreadsheet programs. However, we try to keep readers abreast of major developments in other Lotus products. We are very aware of* Manuscript's *particular strengths, which, in fact, led us to commission a review that compares* Manuscript *with* WordPerfect, *the leading word processor among our readers. The result appears on page 93 of this issue.*

YOU REMEMBER THAT FAMOUS DAY, FEBRUARY 29, 1900

In Daniel Seligman's essay "The Day-of-the-Week Problem" [October], the statement that the Gregorian calendar repeats every 28 years shows a lack of research.

But don't feel bad. Lotus programmers made the same mistake. The 28-year cycle that Mr. Seligman uses to figure out the day of the week began on March 1, 1900. The year 1900, even though it is divisible by four, was not a leap year. But Lotus puts February 29, 1900, into its date calculations, so *1-2-3* gives the wrong day of the week for dates from January 1, 1900, to March 1, 1900. Luckily *1-2-3* ends with the year 2099, because the year 2100, like 1900, is divisible by 4 but will not be a leap year (and when the 28-year cycle breaks down again).

John A. Cloward
Los Angeles, Calif

Editor's note: *Thanks for your correction. A century year must be divisible by 400 to be a leap year.*

Letters to the editor should be sent to Letters Editor, LOTUS *Magazine, P.O. Box 9123, Cambridge, MA 02139–9123. Letters may be edited for length and clarity.*

@ERR

"Keep Afloat with a Sinking Fund" (November): The formula in cell B18 of figure 2 was incorrect due to an editing error. Instead, it should be +$interest*$payment*(switch="N"). With the correct formula in cell B18, the values in all subsequent payment periods will change, and the amount accumulated by the last period *will* equal the desired future value in cell C6. Also note that in Release 1A, the formula in cell B18 should be +$interest*$payment*(switch=0). Thanks to Todd Mitchell, of Montgomery, Ala., for pointing out the mistake.

In the Q&A item "Rounding" (December), we left out an open parenthesis in cell B2 of the figure that appears on page 80. Cell B2 should contain @ROUND({END},0){DOWN}.

June 17, 1988

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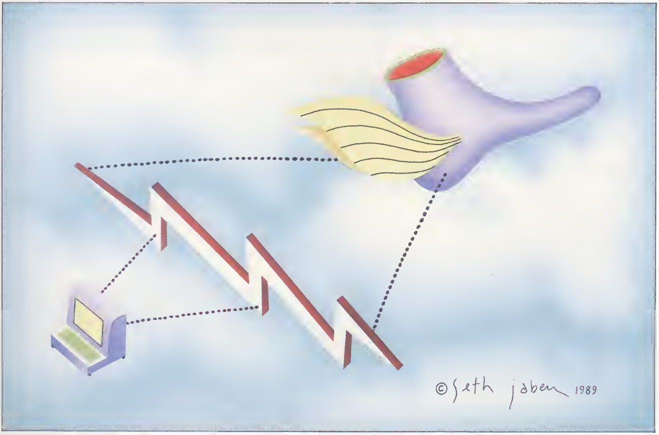
THE 80386
WAITS FOR SOFTWARE

Discussing the merits of computers that are based on Intel Corp.'s 80386 microprocessor is like arguing about whether Miller Lite is less filling or tastes great. For corporate purchasing departments, where investing in 80386 systems is the subject of hot debate, the question is, does the 80386 deliver more speed or more power?

When '386 systems first appeared on the market in early 1987, speed was their major selling point. Users swooned at the 80386's lightning-fast 16-MHz clock speed—twice that of the 80286-based IBM PC ATs then available. But today you can buy 16-MHz PCs based on the 80286 or on Intel's hybrid 80386SX (see box, page 10), and for considerably less than you'd pay for a comparably equipped 80386 system. However, clock speed isn't the only factor in performance. That is, if you run the same DOS application on an

It's got the speed. Now it needs the power.



SETH JABEN

80286 machine and an 80386 machine operating at identical clock speeds, performance will be virtually a dead heat.

For the '386, it's the "more power" argument that software developers are quick to endorse. "Hardware is just a box until you get applications and operating systems to exploit it," says Russ Werner, Microsoft's general manager for DOS and *Windows*.

RUNNING DOS APPLICATIONS ON AN 80386 IS LIKE PUTTING A LAWN-MOWER ENGINE IN YOUR BMW.

Because the software is only now catching up with the hardware, '386s are still a very small part of a large market. Robert Charlton, an industry analyst with the market research firm Dataquest (San Jose, Calif.), says that of some 19 million PCs sold in 1988, only 5% were '386 machines. However, he predicts that by 1992, '386s will account for 35% of sales of nearly 29 million PCs.

Better memory management

Part of the "more power" argument is that, unlike the 16-bit 80286 processor used in PC ATs, the 80386 is a true 32-bit processor. This means that it can directly access up to 4 gigabytes (about 4,000 megabytes) of RAM. By contrast, the 80286 can access only 16 megabytes. In addition, software developed for the 80286 has to swap around 64K segments of code. Keeping track of all those segments is a major headache for programmers. That problem disappears with the '386. Although no software needs 4,000 megabytes of memory, the '386's advanced memory management has important implications for future software.

The real power of the '386 lies in its ability to perform true multitasking, that is, run several programs at the same time. Unlike its predecessors, the '386 has sophisticated memory-protection features that keep programs from colliding when they're running concurrently. Theoretically, the '386 can use this "protected mode" to keep track of an enormous number of separate tasks. And having the processor switch among different tasks is a snap for programmers because a single instruction allows the hardware to control the process. The 80286 processor is also capable of multitasking, but switching among tasks is more difficult for programmers because the control must be programmed into the software.

"The '386 is much easier to program than the '286," says Werner. Stan Lyness, principal engineer for Phoenix Technologies, agrees, up to a point. "It's easier to develop systems software for the '386 than for other chips," he says, "but developing software that truly takes advantage of it is at least twice as much work."

Few applications

To date, few applications take full advantage of the multitasking capabilities of the '386 processor. As a result, most users are running standard DOS applications on their '386 machines. This is something like putting a lawn-mower engine in your BMW. When running plain-vanilla MS-DOS, the 80386 switches to its built-in 8086-compatibility mode, in which the processor can address only 1 megabyte of memory at a time.

One program, Borland International's *Paradox 386* ($895), a specialized version of the company's popular database, uses the '386's protected mode to handle large databases directly. For multitasking, Microsoft's *Windows/386* is the leading environment that takes advantage of the '386 (for others, see box on this page). However, current versions of *Windows* don't work smoothly with applications that aren't written specifically for the *Windows* environment, according to Carole Patton, editor and publisher of *Acknowledge, the Window Letter*, a newsletter for *Windows* users.

That will change with the upcoming version of OS/2 (sometimes called OS/3), which is specifically designed for the '386 processor. Microsoft says it plans to ship OS/3 programming tools to software developers by midyear and expects to

WRINGING MORE POWER FROM THE '386

While the development of software that truly takes advantage of the 80386 processor proceeds at a molasseslike pace, many companies are bringing out programs that partially use '386 capabilities. These so-called DOS extenders bring multitasking to DOS applications by allowing them to run concurrently in expanded memory above DOS's 640K limit.

Windows/386 is the best-known DOS extender, but its inability to smoothly control applications that weren't specifically written for it has opened the door for other DOS extenders, such as *Desqview 386* ($189), from Quarterdeck Office Systems (Santa Monica, Calif.). Quarterdeck added a memory manager to the '286 version of the package, allowing the new version to run multiple DOS applications concurrently, either in full-screen mode or in individual windows.

Another popular package is the *VM/386* operating environment ($245), from IGC (Santa Clara, Calif.). Using the '386's 8086 mode, *VM/386* partitions memory into 640K segments to create what are essentially a series of individual PCs, each running its own DOS application.

Digital Research (Monterey, Calif.) offers *Concurrent DOS 386* ($395 or $495, depending on the number of users), a DOS-compatible operating system that takes a slightly different approach. The operating system lets you hook up as many as nine terminals to a '386-based computer, turning it into a multiuser system.

Still other products capitalize on the 80386's ability to use the otherwise idle memory that sits between 640K and 1,024K on PC ATs. One of these is *386*^{Max} ($74.95), from Qualitas (Bethesda, Md.). Using the '386's memory-management hardware, *386*^{Max} gives some DOS applications up to 704K of RAM and runs memory-resident programs between 704K and 1,024K.

One innovative piece of hardware even gives your 80286-based PC AT some of the advantages of a '386 processor. Although it won't speed up your system, Chargecard, a $399 circuit board from All Computers (Toronto), gives a '286 computer the memory-management capabilities of a '386.

Installing the board is a matter of relocating your 80286 chip to a socket on the Chargecard and slipping the whole thing back into your PC. If you have a non-IBM machine, you'll need All Computers' socket adapter ($100). —*S. M.*

see applications by the beginning of 1990. According to Microsoft's Werner, OS/3 will have "real functional differences" from OS/2, which is full of programming compromises because it was designed for the 80286.

No program for all processors

Whatever its final form, industry analysts agree that OS/3 will be the first IBM PC–based operating environment to truly take advantage of the inherent power of the '386. Werner predicts that because OS/3 will be a true 32-bit operating system, corporate applications that now run on minicomputers and mainframes will move to the new PC operating system.

In addition, OS/3 is likely to engender entirely new applications, not just rewrites of existing packages. In fact, says Werner, retrofitting existing DOS software to the '386 will become "a helluva job." According to John Dunkle, vice president of WorkGroup Technologies, a computer-market research firm in Hampton, N.H., "Making each generation of processors compatible all the way back to an 8088 is becoming increasingly difficult." That is, developers may have to abandon the idea of designing programs that run well on all processors.

But if you're an IBM PC XT owner worried about being forsaken by newer hardware and applications, industry experts have words of comfort. Says Microsoft's Werner, "DOS will never die."

—Stan Miastkowski

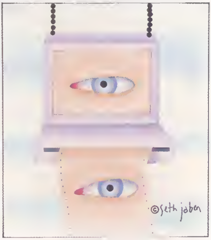
THE 80386SX TRADE-OFF

If you don't need the top speed of an 80386 computer, Intel's hybrid 80386SX processor can offer you a lower-cost alternative. Some people call the 80386SX a "crippled" version of the 80386. Internally, the '386SX is a full-fledged 32-bit processor, but it uses a slower 16-bit bus for input/output operations and memory access. This doesn't seriously affect standard DOS applications because they're designed to use 16 bits. Industry benchmarks show that with standard DOS applications, when an 80386 and an 80386SX run at the same clock speed, the 80386SX runs only 5% to 10% slower than the 80386. The performance difference increases when running 32-bit applications, such as *Paradox 386*. In this case, the '386 is about 30% faster, says Michael Slater, editor and publisher of *Microprocessor Report*.

A 16-MHz '386 processor currently costs manufacturers about $200, according to Slater. At about $165, a comparable 80386SX chip not only costs less, but also requires simpler electronics. Manufacturers can build an 80386SX PC for only 5% to 10% more than comparable '286-based PC ATs. As a result, the cost to the consumer is usually midway between a '286 and a '386. *—S. M.*

A PAGE-DESCRIPTION LANGUAGE FOR SCREENS

The maker of PostScript is out to establish another standard.



Adobe Systems, the software company whose page-description language drives most laser printers, wants to extend that control to your PC screen. Over the last couple of years, the Mountain View, Calif., company has succeeded in establishing PostScript as the industry standard. Now Adobe is betting that its new Display PostScript System, a screen-description language, will be equally successful.

Essentially an extension of PostScript, the Display PostScript System allows computer monitors to show an exact duplicate of what a PostScript-capable printer can produce. Applications that are written to support Display PostScript can be displayed on any type of screen, regardless of size, resolution, or color capability, says Pat Marriott, director of marketing for Adobe's Systems Division. In this way Display PostScript is like PostScript, which describes graphic images so that any PostScript-capable printer can print them, no matter what the resolution or type of device.

According to Adobe spokeswoman Brenda Hansen, Display PostScript will be incorporated into a computer's operating-system software rather than reside in the printer, as PostScript does. In addition, PostScript exists as a subset within Display PostScript. This means that, in theory, if you have software that can translate PostScript operators into another printer protocol, Display PostScript can control both the screen and any page printer, even a non-PostScript-capable printer. This typifies the move toward centralizing control within the PC, says Cathy Dingman, an analyst with the market research firm CAP International. "Eventually," she says, "you'll have one processor controlling a scanner, the display, and a printer."

High cost and lots of memory

While the idea of a unified printer and display standard is tantalizing, there are some major drawbacks, says Joan-Carol Brigham, senior analyst for International Data Corp., a market research firm in Framingham, Mass. For one, she says, the Display PostScript technology is extremely expensive to license. Adobe wouldn't disclose its licensing fee, but Brigham thinks the cost to manufacturers may increase the price of a computer by $500 to $1,000. Display PostScript also requires a whopping 2 megabytes of memory and the processing power of at least an 80386 computer. "Even when you run it on the machine from Next Inc. [which has a fast Motorola M68030 processor], it's pretty slow," Brigham says. "You won't see this on lower-end PCs in the near future," she adds.

Although Brigham says that the screen images are extremely precise, she questions whether users are willing to pay for this extra level of detail. "How many people use an application where their sensibilities would be offended by anything other than an exact, on-screen duplicate of what their output will be?" she asks.

Adobe plans to license the technology to computer manufacturers, but so far only a few companies have bought into the concept. The most notable is Steve

SETH JABEN

Jobs's Next Inc., but Digital Equipment Corp., IBM, and Scitex America Corp. are also licensing Display PostScript, in some cases for future products.

Display PostScript won't be useful, however, until software developers begin writing Display PostScript drivers for their programs. And Adobe's Marriott doesn't expect volume shipments by licensees for a while.

In addition, Adobe may face competition. Phoenix Technologies, for example, is developing a Display PostScript workalike product that features device-independent code that hardware manufacturers can then tailor to their own products. But don't count Adobe out. The company faced stiff competition when it was trying to establish PostScript and clearly won that battle by persistence and clever marketing. *—Jon Pepper*

RUN LARGE DOS PROGRAMS IN OS/2

New expanded-memory drivers make it possible.

OS/2, billed as the personal-computer operating system of the future, wasn't designed for today's memory-hungry DOS applications. Many people who switched to OS/2 thought they could run their DOS programs in OS/2's DOS compatibility box while they waited for true OS/2 applications. They soon discovered that they couldn't. But help is on the way.

The problem is that DOS programs running in the compatibility box can't access expanded memory. The reason, says Mark Mackaman, Microsoft's OS/2 product manager, is that running programs in OS/2's DOS compatibility box is not the same as running them under DOS. As a result, he says, the expanded-memory-specification (EMS) drivers that work under DOS won't work under OS/2.

However, says Mackaman, it's a fairly simple matter to write new drivers that allow DOS programs running under OS/2 to access expanded memory. Most companies that sell expanded-memory boards are either shipping or about to ship the new drivers. Once written for OS/2, the EMS drivers will allow applications running in the DOS compatibility box to access expanded memory using the same 640K-to-1-megabyte address space currently available to DOS users.

Intel Corp. (Hillsboro, Oreg.) already has an EMS driver for Micro Channel–compatible memory boards on the market. And Jim McNeil, senior manager for software marketing at AST Research (Irvine, Calif.), says AST will ship an expanded-memory driver for its RAMpage Plus board this month.

These new drivers solve another memory problem. According to Mackaman, only about 540K of conventional memory is available to DOS applications running in the compatibility box. However, with the addition of expanded-memory drivers, applications running in the compatibility box should perform "at or above the level of performance currently available under DOS," says AST's McNeil.

One company that isn't yet writing an EMS driver for OS/2 is Quadram Corp. (Norcross, Ga.). Tim Cutler, the company's marketing manager for board products, says Quadram hasn't seen enough demand so far to invest the time. "EMS drivers are just an interim solution," says Cutler. "People want OS/2 applications that run outside of the compatibility box." *—Jon Pepper*

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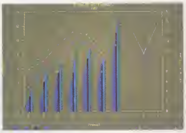

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HYPERTEXT CONNECTS DISPARATE DATA

Extract a world of data, layer by layer

Hypertext, an emerging programming technique that ties disparate data together in a way that is useful to the individual user, has the potential to change the way we work with computers, as well as the way we organize and use information. But it won't happen overnight. While first-generation hypertext programs are now available, sophisticated systems won't be in wide use for several years. "Businesspeople are just becoming aware of the degree of interconnectivity of information," says Dan Shafer, a consultant from Redwood City, Calif., and an expert in the field of artificial intelligence.

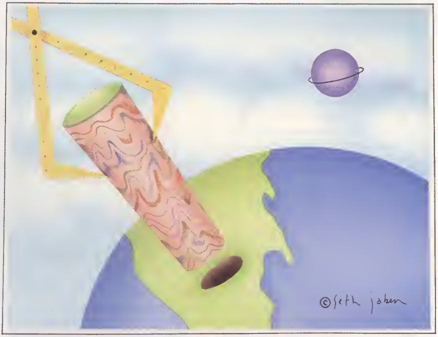
In a typical office, various people use related information in different forms. "It's rarely the case that one person can get the total picture or that all the relevant information is contained within one source," says Jeffrey Tarter, publisher of *Softletter,* a software-industry newsletter based in Cambridge, Mass. "Business information is nonlinear."

Hypertext goes a long way toward making a fund of information accessible to various people for their individual purposes. What hypertext does, in its simplest form, is layer information. It lets you cut complex information into separate parts that you can retrieve according to your needs. In a report on closing a manufacturing plant, for example, you might jump from a graph showing manufacturing costs versus revenues to a *1-2-3* spreadsheet showing the cost breakdown in detail. Then you may want to go to a statistical analysis of the closing's impact on the company's balance sheet. In another part of the report, you might jump to a news summary of similar plant closings and review a public relations campaign developed to blunt the impact of the closing.

Playing hopscotch with ideas

In a hypertext document, marked words or commands are doorways to information in other parts of the document, in other documents, or even in other applications. Reading a hypertext document is like playing hopscotch with ideas. Since each area or block of information may be linked to several others, you can jump around wherever your fancy takes you. That's both the strength and weakness of hypertext.

Hypertext programs not only allow you to form nonlinear links within textual information, they also let you mix media. Full-motion video, animation sequences, sound, and graphics can all be joined in one document. A few years ago, Microsoft produced an experimental hypertext CD-ROM on the life of Beethoven. At points throughout the text, you could click on highlighted words to look at a picture of the composer, view the score of his fifth symphony, or even hear portions of the music.



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By linking many forms and sources of information, hypertext can ease the problem of writing for a wide range of expertise without confusing the novice or boring the expert. Hypertext lets a reader pursue a topic to the depth that is most appropriate to his or her needs. "In essence, hypertext lets you create an information system that users can customize," says Jim Culbertson, director of product marketing for Owl International (Bellevue, Wash.), developer of the hypertext program *Guide*.

Today there are a dozen or more hypertext programs for PCs. Some are mainly useful to professional software developers who create hypertext information systems consisting of many elements. The reader then needs a run-time version (a small portion of the hypertext program) in order to read the hypertext document. *Houdini* ($89, from MaxThink, Kensington, Calif.) is one such developer-oriented program; *PC Hypertext*, available in the public domain, is its run-time version. Other programs, such as *Guide* ($275 for the IBM; $199 for the Macintosh) and *Black Magic* ($79.95, from Ntergaid, Bridgeport, Conn.), are intended to let you define hypertext links among the documents you create.

In December MaxThink released *TransText*, a hypertext word processor that includes 19 utilities. One of them, HyperRez, is "a memory-resident hypertext utility that lets you create hypertext links in any application," says Neil Larson, MaxThink's president. "With it, you can attach a lengthy explanation—up to about 10 screens full of text—to a cell in a *1-2-3* worksheet."

A hypertext future

One of the more powerful features of some hypertext programs is the so-called hot link. More than a standard hypertext link, which links information within the same application, a hot link lets you access information in another application. You might use hot links, for example, to connect a *1-2-3* spreadsheet, a video presentation, and an animation sequence. Hot links are still crude, however. You can forge a link to a specific file, but you can't define the link as a specific place in that file.

"I want to be able to jump to a specific cell in a spreadsheet or have a number in a hypertext report automatically updated when that number changes in a *1-2-3* worksheet," says Mark Bernstein, chief scientist at Eastgate Systems (Watertown, Mass.), maker of *Hypergate*, a $200 hypertext program for the Macintosh. This capability is coming, Bernstein claims. Within the next five years, he says, hypertext programs will let you create sophisticated links easily.

But designing a simple hypertext information system takes considerable time and know-how. "Making complete and consistent links is challenging," says Bernstein, because hypertext requires that you view information in a new way. Furthermore, following or creating hypertext links can get confusing, especially if you jump into and out of several applications.

A middle approach

Most hypertext programs offer navigational aids or a way to retrace your steps. For example, in *Houdini*'s hypertext documents, you can request an audit trail that tracks your steps through the information. *Hypergate* lets you leave "bookmarks" at certain points within the data or lets you create the equivalent of thumb tabs that list important places in a document.

One of the more ambitious hypertext programs is *KnowledgePro*, a software-development tool from Knowledge Garden (Nassau, N.Y.). It's a cross between a hypertext writing program and an expert-system generator. *KnowledgePro* structures the way you can jump around a hypertext document. In an unstructured hypertext document, you can shoot off on tangents, exploring realms of ancillary knowledge. But, as consultant Shafer points out, "You cannot be sure someone will ever follow a main learning path and be exposed to all the major points in the information base."

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Shafer compares the unstructured system to a teacher who tosses a bunch of 3-by-5 cards at each student and says, "Explore what you want." An expert system, by contrast, gives few, if any, choices on how to wade through information.

KnowledgePro takes a middle approach between the free-form nature of hypertext and the rigid structure of an expert system. It lets a software developer build a path through a complex document, making sure that the user is exposed to the main points but is still free to explore tangential ideas. Knowledge Garden also sells an add-in, *KnowledgePro Database Toolkit*, that lets you access *dBase III* and *1-2-3* files while you're working in an application generated within *KnowledgePro*.

Advocates see hypertext becoming part of a wide range of applications. Even beyond its use within applications, some people believe hypertext will play a major role in the next generation of operating systems. "In the next five to ten years," says Eastgate Systems' Bernstein, "hypertext will determine the way programs interact with people."

—Henry Fersko-Weiss

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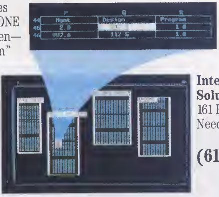

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COMPUTER ACCESS FOR THE BLIND

The government sets standards.

Imagine using your favorite computer program with your eyes closed. Difficult, but possible if the program is character-based and you have a special board that converts the words and numbers on your screen to speech. Now, with your eyes still closed, imagine trying to use a graphical program that depends on a mouse and icons.

That's the problem facing thousands of blind computer users, as the software industry increasingly turns toward graphical user interface (GUI) programs. It's a problem that will soon affect computer firms—at least those who want to sell programs to the federal government. The General Services Administration is developing a set of accessibility guidelines for government purchases of computer hardware and software. Its proposal calls for accessibility for nonsighted individuals wherever possible.

By contrast, the next generation of PC software—from *1-2-3/G*, Lotus Development Corp.'s graphical version of *1-2-3*, to Presentation Manager, the graphical interface for OS/2—promises to make more frequent use of pointing and graphics.

Words are better

"I don't work with any program that has graphics," says Joe Roeder, president of PC Partners, a Baltimore consulting firm that specializes in computer access for the blind. Roeder, who is blind, uses a voice-based PC system both for training and for running his business. "I don't know of any voice software that works with the Macintosh or with icons," he says. "Sometimes a word is worth a thousand pictures."

Without question, interest in computer accessibility for nonsighted individuals is growing. In October, at a conference cosponsored by several leading organizations for the blind, a group of experts in blind perception and computer technology met for four days at the Trace Research and Development Center of the University of Wisconsin, Madison. The participants, including Apple Computer, IBM, and AT&T, compared notes on the

INTERVIEW: SAID MOHAMMADIOUN STAKES COMPANY ON NEW PROGRAM

Samna Corp.'s chairman and CEO bets all on Amí, *a graphical word processor.*

Samna Corp. was an early contender in the IBM PC word-processing market, having released its first product, *Samna Word II*, in August of 1983. Founded by Said Mohammadioun and three partners, the company grew out of Mohammadioun's experience with dedicated word processors at Lanier and his belief that PCs were going to claim the lion's share of the word-processing market.

Mohammadioun's assessment proved correct, but Samna never became a major force in the market. In 1988, the firm had more than 14 million in sales, according to Mark Dunkel, an analyst with The Robinson Humphrey Co., an investment firm in Atlanta. Now, Mohammadioun is staking Samna's future on a new word-processing program, *Amí*. The program is the first *Microsoft Windows*–based word processor of any substance, and it has drawn raves for its easy-to-use interface, advanced desktop-publishing features, and low price. But can a little-known company persuade *WordPerfect* and *Microsoft Word* users to switch to a graphical-based word processor? In a December interview, Mohammadioun spoke to reporter Jon Pepper about this and other questions.

FRED GERLICH

LOTUS: Why is the graphical user interface so important?

S. M.: I started thinking about the graphical user interface (GUI) about two and a half years ago and closely followed the development of the hardware and software designed around that concept. The GUI is becoming a standard. For computer usage to continue growing, the industry has to converge on a standard interface. It doesn't have to be a perfect interface—just standard. This would allow software developers to reduce training time and allow users to learn many programs without investing lots of time.

LOTUS: *Amí* has been getting good press from analysts and reviewers. What makes the program so appealing?

S. M.: The program has two main strengths. One is that it is the first powerful word processor that runs under *Windows*. The second strength is its interface, which not only complies with the *Windows* guidelines but is in some ways more intuitive. For example, you don't have to remember what the Palatino text font looks like or how big a 12-point type size is. If you click on a menu selection, you'll see a sample of it immediately. You don't have to understand a lot of word-processing jargon because you see the result of your choices immediately.

LOTUS: Do you expect other companies to come out with similar products?

S. M.: It wouldn't surprise me to see others do this.

LOTUS: Have you entered this market too soon?

S. M.: There is a trade-off. Being first in the market is difficult. You have to invest money to help the market grow. But you also have the advantage of not having much competition. Timing is very important. We started the *Amí* project in problems of visual interaction in future computer interfaces. "First we have to solve the problems at the operating system level," says Gregg C. Vanderheiden, a researcher at the Trace Center. "Then we can go on to the next step: creating useful applications."

Accessible programs to come

Both IBM and Apple confirm that they are working on nonsighted access to graphical interfaces, although neither will comment about unreleased products. Developing programs accessible to the blind gets harder as the operating system gets more complex, says Walter Nawrocki, product manager for IBM's Special Needs Systems. "OS/2 programs are more difficult than DOS programs," he says. "There's no question about that."

Some software firms say they plan to meet the government guidelines by offering alternative interfaces or by providing programming information that lets others develop alternative methods of input for their programs. Other firms, such as Lotus, have already sold so many nongraphical programs that they plan to provide character-based versions of upgrades and new releases.

However, accessibility advocates are pressing for a greater effort. Jerry Kuns, an accessibility consultant in San Francisco, says that the onus should be not only on the computer industry but also on employers. "After all," he notes, "you supply lighting for people who see."

—Steve Rosenthal

PUTTING APPLE AND IBM IN TOUCH

Open a line of communication between your Macs and PCs.

Although there are technical problems to overcome, PCs and Macs can work together. "It's getting easier all the time," says Chris Veal, a partner in the San Jose, Calif., office of Arthur Young & Co., a Big Eight accounting firm. Veal's office is now 80% Mac-based and 20% PC-based. But even if all the office computers were Macs, he says, sharing data with PCs would still be necessary because many clients use them.

Sharing files between Macs and PCs is a two-part problem. The first part of the

September 1987, and we think our timing is near perfect.

LOTUS: How did a small company like yours get the jump on larger software companies in this development effort?

S. M.: Producing good software doesn't depend on the size of your company. It's more a matter of focus. If software quality depended on company size, IBM would own the market. I think being a small company actually helps us, since we can make decisions quicker and are more likely to take risks.

LOTUS: How much have you invested in developing *Amí*, and how much will you spend to market it?

S. M.: Without going into dollar figures, I can tell you that we invested a little more than 100 man-months, so you can figure it out. We think *Amí* is important to our growth as a company. To be a long-term player today, you have to have a strong representation in the GUI environment. Bruce Cummings, our vice president of marketing, says we are planning to spend about $3 million in advertising, which is a lot for a company of our size. So if *Amí* sells well, we are in good shape. If it doesn't, we'll have to see.

But that is part of being an entrepreneur. If you want to be successful, you have to make bold moves. You can't afford to be conservative unless you are a big company. A small company that is conservative won't be a long-term player.

LOTUS: Could *Amí*'s $149 introductory price lead some people to consider it a lightweight product?

S. M.: The low price may be a liability if we don't manage to get the message out about what it is. This month the price increases to $199, which is still low. But we think the word-processing market needs two levels of product, and we have announced our intention to introduce *Amí Professional*, which will cost $495.

LOTUS: Do you expect people to switch to *Amí* from the leading products like *WordPerfect* and *Microsoft Word*?

S. M.: We don't expect to see a quick switchover, but we think there will be two categories of word-processing programs: graphics-based and character-based. Over the long term, the graphical user interface will gradually become dominant, but the expensive hardware requirements [for *Windows*] will keep character-based word-processing programs, which use less-expensive hardware, around for some time to come.

Also, not everyone will move to the GUI version of *WordPerfect* or *Microsoft Word*. We hope to pry some users loose from other products. In any event, I think a product like *Amí* helps broaden the market.

LOTUS: Who will use *Amí*—those who are unhappy with their current product or new word-processing users?

S. M.: There will be two categories of *Amí* users. The first market will consist of people who are just starting out and have no reason to begin with a more difficult user interface. We are proud of our *Samna Word IV*, but it isn't as easy to use as *Amí*. The second market will be companies who are now deciding to standardize on the GUI environment because of the lower training costs. We have an advantage in that market because we have a product that is available now.

LOTUS: As the industry moves to the graphical user interface, how will companies distinguish their products?

S. M.: Take cars as an example. Engine designs aren't all that different among today's cars. Cars are differentiated in their look and feel and in price/performance factors. I think the same sort of thing will happen in the software business. The differentiation won't be in menus or command lines or function keys but will move into a subtler arena.

Although *Amí*'s interface is based on *Windows*, the program isn't identical to other [*Windows*-based] programs. We have managed to create some significant differences, and I don't see any reason why other companies can't do the same with their products. ■

problem involves the physical transfer of files from one machine's disk to another's. The second part is the translation of files from the format of the originating application to a format that the new application can read.

The hardware connection

Transferring files usually requires a hardware link, but Apple Computer's new Floppy Drive High Density (FDHD) disk drive for the Mac IIX and Mac SE 30 eliminates the need for extra hardware. The FDHD reads the 3½-inch PC disk format, as well as the Mac II disk format, says Craig Elliot, Apple's marketing manager for MS-DOS and OS/2 integration.

Another high-density drive, the Turbo Floppy ($395, from Peripheral Land, Fremont, Calif.) works with all Macs. The drive supports both 720K and 1.44-megabyte floppy disks and can read and write to 3½-inch DOS-formatted disks.

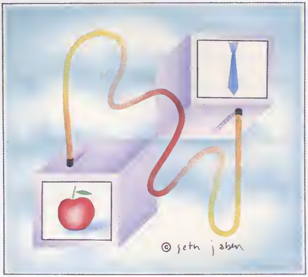
Aside from specialized disk drives, there are plenty of other ways to make the hardware connection. Perhaps the simplest is with communications links. You can use a modem to communicate data either directly or via an on-line service such as MCI Mail. Or you can move data across a local area network such as Apple's AppleShare or Novell's NetWare.

You can also use a shared file server, which offers the advantage of letting PC and Mac owners share data directly, without the intermediate step of file-format translation. However, you don't need to buy a new computer or drive to act as a file server. You can install an interface board in your PC and connect the PC to the Mac. For example, DayStar Digital (Flowery Branch, Ga.) sells the LT200 interface board ($249; $395 for the Micro Channel version), which lets IBM PCs and PS/2s share any file server under LocalTalk, Apple's network software. Steve Simpson, DayStar's marketing director, notes that any PC with a hard disk can act as a shared server under LocalTalk.

Another way of transferring files directly is to connect a Mac and a PC with a product such as LapLink Mac ($139.95, from Traveling Software, Bothell, Wash.) or MacLink Plus ($195, from Dataviz, Trumbull, Conn.). Both products include a cable that connects the serial ports of the machines, plus software that handles both communications and file-format translations. The main difference between the two products is that LapLink Mac is controlled from the PC and MacLink Plus is controlled from the Mac.

Traveling Software created LapLink Mac to handle its own connectivity problems. President Mark Eppley recalls that he tried to transfer a scanned image from a PC to a Macintosh a few years ago and couldn't find anything that worked fast enough. "Speed is especially important when transferring graphics files," he says. LapLink Mac, Eppley says, can transfer files at up to 57,200 bits per second.

The fastest way to transfer files, however, is by using a direct connection through the Mac's SCSI (small computer systems interface) port, says Cynthia Harriman, coauthor of *The MS-DOS–Mac Connection: Data Sharing, Networking and Support in the Mixed Office* ($21.95, Brady Books, 1988). To make the connection, you can use a product such as Quickshare ($465, from Compatible Systems Corp., Boulder, Colo.), which includes a special cable and a SCSI board for your PC. "For big files," says Harriman, "the speed is a real advantage."



Software solutions

Physical connections are only half the battle. The other half is the problem of translating back and forth between files created on PCs and those created on Macs. With text files, for instance, how do you translate from the Mac's bit-map formats to the PC's ASCII formats? With graphics files, how do you translate the square-bit maps of the Mac into the rectangular-bit maps of the PC?

Files from some programs, such as *WordPerfect, Microsoft Word,* and Aldus Corp.'s *PageMaker*, don't have to be translated because the Mac and PC versions of these programs can use the same file formats. For files that must be translated, however, software solutions abound. Mastersoft (Phoenix) licenses its translation program, *Word for Word*, to several vendors, including Traveling Software, which uses it in LapLink Mac. The retail version, *Word for Word Professional* ($149), translates only among MS-DOS formats, but *Word for Word Macintosh*, which will translate between Mac and PC formats, is due out this month, according to Lise Lambert, Mastersoft's vice president of marketing.

Like LapLink Mac's software, a new program called *xFer* ($99.95, from Messenger Software, Rocky River, Ohio) handles both communications and translations between PCs and Macs. The program can process single files or entire directories, in both directions. "Once you set up the process with passwords and baud rates," says John Katzendorn, Messenger's president, "it's all done from the Mac." Some *xFer* translations, such as those from *1-2-3* to *Microsoft Excel*, are quick and simple. For other files, such as database files and many word-processor files, you have to set up your own translation tables in *xFer*.

Translating graphics files is a tougher job. Some graphics translations can be handled by a public domain program called *Mac-Wind*, author Harriman says. The program translates *MacPaint*'s PICT files into the MSP format of Microsoft's *Windows Paint* program. Programmers Joel Finkel and Peter Sills of Chicago created *Mac-Wind* to give *Windows* users access to the large clip-art collections available for the Macintosh. But Harriman notes that even small translations take time. In one case, Harriman found that *Mac-Wind* took 65 seconds to translate a 9,447-byte *MacPaint* file into a *Windows Paint* file.

Except for color files created on the Mac II, most Macintosh graphics files use the PICT format, but PC graphics programs use many different formats. The .CGM and .GMF file extensions of *Lotus*

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Freelance Plus Release 3.0, for example, use the Metafile standard endorsed by the American National Standards Institute, but *1-2-3* and *Symphony* create PIC files. Z-Soft Corp.'s *PC Paintbrush* creates PCC and PCX files, and Digital Research's GEM operating environment creates GEM and IMG files. Then there's the TIFF (tagged image file format) standard used by *PageMaker* and other programs requiring extensive use of gray scales. To complicate matters further, there are both PC and Mac versions of some file-format standards.

The Graphics Link Plus+ ($149.95, from PC Quik-Art, Athens, Ga.) can translate among all IBM PC or Mac bit-map graphics formats. But even with the growing body of file-translation software, says James Alexander, president of PC Quik-Art, file-translation problems will be around for a while. "Every program seems to have its own file format, which its creators call proprietary," he says. "There are more than 100 variations of Z-Soft's PCC file format alone."

Another complication in translating graphics files is that while most graphics programs create bit-mapped files, programs such as *AutoCAD* and other computer-aided-design programs create object-oriented graphics files. In order to understand the difference between bit-mapped and object-oriented graphics, imagine drawing a circle on top of a square. If you then remove the circle, a bit-mapped program will lose the part of the square that is under the circle, but an object-oriented program understands the relationship of objects and will save the entire square.

Object-oriented graphics files have their own translation problems and solutions. One program, *CADMover* ($495, from Kandu Software, Arlington, Va.), translates the DXF format used by *AutoCAD, VersaCAD, MaxiCAD*, and some popular Mac programs to the Mac's PICT format. Ken Lathan, Kandu's director of software development, says *CADMover* can also read the IGES format often used on the DEC VAX and other mainframes.

Sharing files between Macs and PCs takes a little finesse, but with the right hardware and software, you can open a Lotus or Microsoft file on the PC and move it to the Mac—fonts, formatting, and all. Despite the complications, notes DayStar's Simpson, "software is bringing Macs and PCs closer every day."

—Dana Blankenhorn

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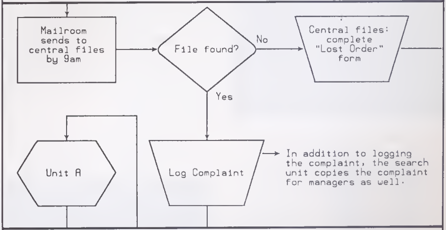
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A DESKLESS PC

When is a desktop PC not a desktop PC? When it's everywhere *but* on the desk. In February, Innovation Computer Corp. (Cleveland, Wis.) began shipping its $6,990 model 2001 ST, an 80286-based system nicknamed the "Stealth PC." Executed in high-tech matte black, the unit's flat-screen monochrome monitor floats above the desk surface, suspended from a Luxo Lamp–type adjustable arm. The 6-inch by 15-inch system unit, which contains three slots, a megabyte of memory, and a 3½-inch disk drive, weighs just 35 ounces and can be secured beneath or alongside the desk with Velcro straps. That leaves only the keyboard, and if you stow it in a pull-out drawer, you end up with an empty desktop and a PC only its mother would recognize. *—Jennifer Smith*

MISSION POSSIBLE: SAVE JFK

November 22, 1988, marked the 25th anniversary of the assassination of John F. Kennedy. Numerous books, articles, and television specials reviewed and reanalyzed the tragedy. Now you can use your PC to go back in time and try to forestall the staggering event with *Guardians of Infinity*, a $44.95 program for the IBM PC and compatible computers, from Paragon Software Corp., distributed by Medalist International (Hunt Valley, Md.).

The text adventure casts you as a 21st-century physicist. Your mission: Prevent JFK's assassination. In your effort to convince Kennedy not to go to Dallas, you and your agents may meet and interact with more than 125 important people of the Kennedy era, including Jacqueline Kennedy, Vice President Lyndon Johnson, Presidential Press Secretary Pierre Salinger, and Kennedy's alleged assassin, Lee Harvey Oswald. *Guardians of Infinity* comes with a 140-page mission manual that contains detailed itineraries and biographies of historical figures, a 90-page novella that describes the events and circumstances leading up to your trip back in time, and a special graphics disk that illustrates many of those events.

If your mission fails, you still get a valuable history lesson. If you succeed, you alter the course of history. *—J. S.*

EXPLORING FRACTALS AND TESSELLATIONS

Visitors to "The Interactive Image," a new hands-on computer-graphics exhibition at the Boston Computer Museum, can create their own animations and explore advanced mathematical concepts, as well as astrophysical phenomena. The exhibits are designed to appeal to everyone, from toddlers on up to seasoned engineers. "If a 3-year-old pounds on the keyboard, something good happens," says exhibit codesigner Tom DeFanti, professor of electrical engineering and computer science at the University of Illinois at Chicago.

In a game called *Kaleidoscope*, for example, players learn about symmetries and tessellations (identical shapes that fit together to fill an area) by constructing patterns on a computer screen. *Zanimation, Jr.* helps players learn some of the techniques used by professional animators to create motion sequences for films. In *Quark*, a video camera captures a picture of the player's face and displays it on a computer screen. The player can then alter the face, learning in the process how spatial and color resolution affect data-storage needs. Games based on fractals and graftals teach mathematical techniques for creating complex, realistic forms from a handful of data points. "The Interactive Image" is a permanent exhibit at Boston's Computer Museum. *—Rich Friedman*

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Yes. There are ways to take something that's very powerful and make it easier to use.

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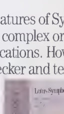
But Symphony is really more than five separate programs. Because, unlike other integrated packages, Symphony lets you dynamically integrate functions. For example, when you change spreadsheet data, your graph of that data and your memo containing the same numbers automatically reflect the changes. So you get greater efficiency, and you're able to work faster too.

Plus, the Symphony spreadsheet is the fastest and most powerful spreadsheet available in integrated software, based on Lotus® 1-2-3,® the industry-standard spreadsheet technology.

We could go on about the many features of Symphony 2.0—how its macros let you automate complex or repetitive tasks and create customized applications. How the word processor now has a spelling checker and text outliner. And how database and communications have been improved.

The bottom line is that Symphony is one high performance package that's made to be opened up.

Current Symphony users: call 1-800-Trade Up and ask for extension 204 to upgrade to Release 2.0.



Lotus Symphony 2.0

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START HERE

INTRODUCING THE WORKSHEET

Installment One in a new series for *1-2-3* beginners

BY DANIEL GASTEIGER

Our readers tell us that we haven't written enough for beginners. In response, this month we kick off a series of columns for newcomers to *1-2-3*. Even if you're about to run *1-2-3* for the first time, you'll be able to follow along. This article introduces you to the program and shows you how to get around in the worksheet.

WHY LEARN 1-2-3?

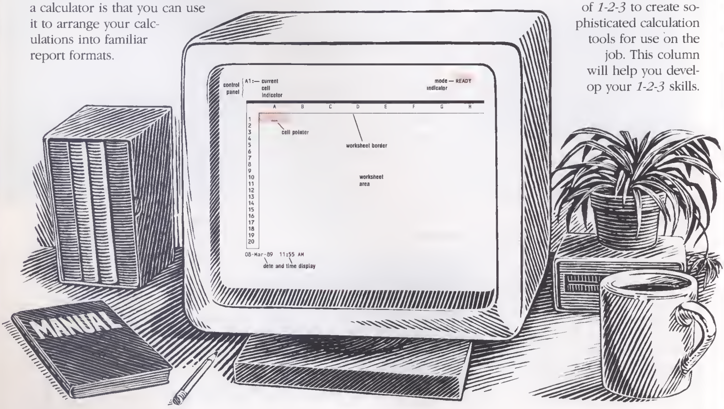
As an electronic spreadsheet, *1-2-3* is a tool that you can apply to many business functions. By the end of this discussion, we'll use *1-2-3* at its simplest—as an oversize desktop calculator. But *1-2-3* can perform far more complex financial calculations than most calculators, and it can remember every calculation it performs and repeat calculations using alternative numbers.

Another advantage of *1-2-3* over a calculator is that you can use it to arrange your calculations into familiar report formats.

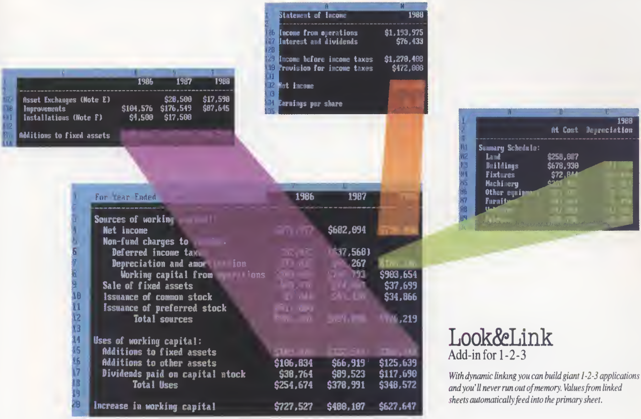
For example, when you use your calculator, paper, and pencil to create a budget, you generally label expenses, enter values into various blanks on the paper, do some math, and enter the results on the bottom line. *1-2-3* lets you do all this, but you don't have to recalculate your bottom line every time you change a value in one of your budget categories; *1-2-3* recalculates the bottom line for you.

Any numbers you enter and calculate in *1-2-3* can be displayed as bar and line graphs and pie charts. And *1-2-3* helps you alphabetize and peruse lists of information (databases), such as postal addresses, historical sales data, and employee payrolls.

Look over the table of contents in a few issues of *LOTUS* to find suggested uses for *1-2-3*. *LOTUS* articles also show you how to use your knowledge of *1-2-3* to create sophisticated calculation tools for use on the job. This column will help you develop your *1-2-3* skills.



GREG DEARTH



```
Statement of Income                          1988
--------------------------------------------------
Income from operations                 $1,193,975
Interest and dividends                    $76,433

Income before income taxes             $1,270,408
Provision for income taxes               $472,000

Net income

Earnings per share
```

```
                               1986      1987      1988
-------------------------------------------------------
Asset Exchanges (Note E)              $20,500   $17,590
Improvements               $104,576  $176,549   $87,645
Installations (Note F)       $4,500   $17,500

Additions to fixed assets
```

```
                                        1988
                           At Cost  Depreciation
------------------------------------------------
Summary Schedule:
  Land                    $258,087
  Buildings               $678,930
  Fixtures                 $72,8
  Machinery
  Other equip
  Furnit
```

```
For Year Ended                          1986      1987
--------------------------------------------------------------
Sources of working
  Net income                                 $682,094
  Non-fund charges to
    Deferred income tax                      ($37,568)
    Depreciation and amor                        267
      Working capital from                               $903,654
  Sale of fixed assets                                    $37,699
  Issuance of common stock                                $34,866
  Issuance of preferred stock
        Total sources                                        ,219

Uses of working capital:
  Additions to fixed assets
  Additions to other assets         $106,834   $66,919   $125,639
  Dividends paid on capital ntock    $38,764   $89,523   $117,690
        Total Uses                  $254,674  $378,991   $348,572

Increase in working capital         $727,527  $480,107   $627,647
```

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LOOK&LINK™ for 1-2-3® Release 2 lets you build applications that span across worksheets. You get dynamic linking and consolidation plus the ability to see two sheets on the screen at the same time.

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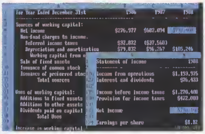
Have you ever wanted to look at one worksheet while using another? Now you can. A special pop-up window lets you see a second worksheet with the push of a key.



```
For Year Ended December 31st          1986      1987      1988
---------------------------------------------------------------
Sources of working capital:
  Net income                      $276,977  $682,094
  Non-fund charges to income.
    Deferred income taxes          $32,872  ($37,560)
    Depreciation and amortization  $79,032   $96,267  $105,246
      Working capital from o
  Sale of fixed assets
  Issuance of common stock
  Issuance of preferred stoc
        Total sources

Uses of working capital:
  Additions to fixed assets
  Additions to other assets
  Dividends paid on capital
        Total Uses

Increase in working capital
```

```
Statement of Income                     1988
---------------------------------------------
Income from operations            $1,193,975
Interest and dividends               $76,433

Income before income taxes        $1,270,400
Provision for income taxes          $472,000

Net income

Earnings per share                     $1.12
```

You can scroll up, down, left or right, move and resize the window, swap sheets between windows, and cut and paste between sheets. And that's just the beginning.

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With LOOK&LINK, any worksheet can pull information out of other worksheets on disk or expanded memory (optional). You might link a 1040 tax worksheet to its supporting schedules.

Link a cell or a range. Link values or summary information. Perform table lookups. It's easy – move the cursor in the pop-up window to define the link cells.

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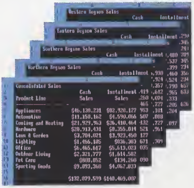
LOOK&LINK also does automatic consolidations, complete with audit trail. You might sum twelve monthly P&Ls to create an annual report or sum regional sales worksheets to produce a national consolidation.



```
Western Region Sales
                         Cash      Installment
```

```
Eastern Region Sales
                         Cash      Installment
```

```
Southern Region Sales
                         Cash      Installment
```

```
Northern Region Sales
                         Cash      Installment
```

```
Consolidated Sales
                         Cash      Installment
Product Line             Sales         Sales
------------
Appliances           $46,130,231   $82,920,127
Automotive           $11,150,162    $4,590,066
Cooling and Heating  $21,929,963   $36,410,464
Hardware             $20,913,431    $8,355,014
Lawn & Garden         $3,704,021    $3,923,450
Lighting              $1,466,105      $836,363
Office                $6,465,617    $5,613,023
Outdoor Living        $2,321,777    $1,614,502
Pet Care                $808,052      $134,260
Sporting Goods        $9,093,360    $4,062,033

                    $132,079,599  $140,469,002
```

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WHAT YOU SEE IN THE WORKSHEET

When you start *1-2-3*, your computer display appears as shown in the figure. The most prominent element of the display is the illuminated row of letters across the top of the screen and column of numbers down the left side. This is called the spreadsheet border.

The spreadsheet is the blank area below and to the right of the border. It is a grid of columns and rows like a sheet of ledger paper or, for the light-hearted, like a Battleship game board.

The letters across the top border identify the spreadsheet's columns; the numbers down the left side identify the rows. As with ledger paper and Battleship game boards, you can place things in the spreadsheet wherever a column and a row intersect. These intersections are called *cells*.

The cell at the intersection of column A and row 1 is illuminated like the worksheet's border and contains a small, flashing underline, called the *cursor*. The illuminated area is called the *cell pointer*. It identifies the cell into which you can enter information at the moment, known as the *current cell*.

To further identify the current cell, *1-2-3* displays the cell's address in the top-left corner of the display, above the worksheet's border. A *cell address* consists of the cell's column letter and row number. Thus the intersection of column A and row 1 is cell A1, the intersection of column D and row 5 is cell D5, and so on. When you move the cell pointer, *1-2-3* changes the cell address in the top-left of the screen, so it always identifies the current cell.

A TRIP AROUND THE SHEET

There are 256 columns and 8,192 rows (2,048 rows in *1-2-3* Release 1A) in a worksheet, more than can fit on a computer display. You can think of the worksheet as extending about 23 feet beyond the right side of the monitor and about 180 feet below your desk.

1-2-3 provides a "window" into this large sheet. The window starts out over the spreadsheet's top-left corner, but as you move the cell pointer around, the spreadsheet can move beneath the window so that different columns and rows become visible.

Move the cell pointer to cell A2 by pressing the DownArrow key (↓) on your keyboard's numeric keypad. Notice that the address in the top-left of the display changes when the cell pointer moves.

Now press the RightArrow key (→); the cell pointer moves to cell B2. Press RightArrow six more times and move the cell pointer to cell H2. Again, notice that with each press of the Arrow key, the new cell address appears in the top-left of the display.

If you've followed along so far, your cell pointer now rests at the right edge of the display. When you press the RightArrow key one more time, the cell pointer moves over to cell I2. If your cell pointer had moved beyond the edge of the display, you'd no longer be able to see the pointer. Instead, the worksheet moves to the left, beneath the window.

While the pointer is at the right edge of the display, pressing the RightArrow key moves the worksheet to the left. Press the RightArrow key several more times and note that the letters of the alphabet parade across the worksheet's top border.

Considering that there are 256 columns in the sheet, you'll eventually run out of letters to use as column labels. When this happens in the worksheet's 26th column, *1-2-3* labels columns with pairs of letters. The column after Z is column AA, then AB, then AC through AZ, then columns BA through BZ, and so on to column IV.

You can get a look at column IV quickly by using another key on the numeric keypad. Press the End key and notice that the word *End* appears at the bottom-right corner of the display. Now press RightArrow. The cell pointer hops to the last column of the sheet, and *1-2-3* extinguishes the *End* indicator.

The End key lets you make big jumps in the worksheet. It is especially useful when you start storing information. We'll learn more about it in a future article. For now use the End key to explore a little farther. Press the End key followed by the DownArrow key, and the cell pointer jumps to cell IV8192—the bottom-right corner of the worksheet. Press the End key and then LeftArrow to move the pointer to cell A8192.

Few of your activities with *1-2-3* will take you to the spreadsheet's four corners. Generally, you'll move the cell pointer around within a limited area. You've already used the Arrow keys to move the pointer cell by cell, but you can press other keys to move longer distances without ending up so far away.

Press the PageUp key (PgUp on the numeric keypad) to move the cell pointer up one window's worth of rows. In most cases the window has 20 rows, so by pressing PageUp you move the pointer to cell A8172. It's possible that your copy of *1-2-3* displays more than 20 rows, in which case you will get slightly different results when you press PageUp. Press PageUp two more times to move the cell pointer to cell A8132.

Press the PageDown key (PgDn on the numeric keypad) to move the cell pointer down one window's worth of rows. Your cell pointer should now be in cell A8152.

Just as the PageUp and PageDown keys move the cell pointer through screen-length vertical jumps, the Tab key moves the pointer through screen-width horizontal jumps. For example, press the Tab key (usually on the upper-left of the keyboard and marked by two arrows, each pointing to a vertical line ⇆) and the cell pointer jumps to column I—one screen-width to the right. Hold down the Shift key and press Tab to move the cell pointer one screen-width to the left.

Finally, when you've explored the effects of each of the Arrow keys, the End key, and the PageUp and PageDown

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keys, press the Home key on the numeric keypad. When you press Home, the cell pointer moves back to the top-left corner of the worksheet—cell A1.

MAKING ENTRIES

No tour of the *1-2-3* worksheet would be complete without using some cells to store information. To keep things tidy, move the cell pointer to cell A1, if you haven't already done so, by pressing the Home key.

Before starting a cell entry, notice that the mode indicator in the top-right corner of the display shows READY. The mode indicator changes to reflect your activities. The READY indicator shows that *1-2-3* is prepared to receive cell entries or commands related to managing the spreadsheet.

1-2-3 monitors your keystrokes and reacts appropriately by displaying messages and information in the area above the worksheet. That area, the first three lines of the display, is the control panel.

Almost all of your communications with *1-2-3* pass through the control panel on their way to the spreadsheet. For example, when you make a cell entry, the entry appears in the control panel before it appears in the current cell. When you access the menus or use one of the special function keys (we'll talk more about these in a later article), *1-2-3* displays messages and other information within the control panel.

Use the numeric keys across the top of your keyboard to type the number 8—but don't press any other keys. Now examine the changes to the display. The number 8 should appear at the left end of the control panel on what is called the edit line. Also, the cursor should jump from within the cell pointer to the space immediately following the 8. Finally, the mode indicator should read VALUE to show that you've begun entering a value into the worksheet.

Press Return and *1-2-3* accepts the entry you've made. The number 8 appears within the current cell. *1-2-3* also shows the contents of the current cell alongside the cell's address in the control panel. Move the cell pointer down (press the DownArrow key), and enter 6 by typing the number and pressing Return.

SOME QUICK CALCULATIONS

Entering numbers in the worksheet is a lot like entering numbers into a calculator. We can make the processes even more similar.

Move the cell pointer down once more so that it resides in cell A3. Now type the characters +8+6 and press Return. The result of the addition, 14, immediately appears in the current cell! You can see in the control panel that *1-2-3* keeps track of the calculation that you entered. The entry shown for the current cell is +8+6.

Move the cell pointer down to cell A4 and enter +8*6. The asterisk means "multiply." Hence, when you type +8*6 and press Return, the value 48 appears in cell A4. It may seem silly to enter a plus sign whenever you want to calculate a value, but to *1-2-3* the plus sign means that what follows is an arithmetic expression—a formula.

You can move the cell pointer down and enter formulas until you've filled every cell in column A, but the formulas you're entering are rather limited. The true power of the spreadsheet becomes apparent when you create formulas that refer to existing cell entries.

So far, you've written formulas that use the values 8 and 6, the values in cells A1 and A2. Now move the cell pointer to cell C1 and type +A1+A2. When you press Return, *1-2-3* displays the value 14 in the current cell. When you look in the control panel, you see that the actual entry in cell C1 is still +A1+A2. This is a formula that means "Add the value of cell A1 to the value of cell A2."

Whenever you write a formula, you can use cell addresses to identify values you wish the formula to use. For another example of this, move the cell pointer to cell C2 and enter the formula +A1*A2. *1-2-3* displays the value 48 in the current cell. That is the result of multiplying the value of cell A1 times the value of cell A2.

Now for the kicker. Move the cell pointer back to cell A1. The formulas you wrote for cells C1 and C2 both refer to cell A1. Right now the value in cell A1 is 8 and the formulas use that value to calculate their results. But when you change the value in cell A1, *1-2-3* immediately recalculates the formulas to reflect the new value.

Try it. To replace an entry in a cell, simply make a new entry on top of the first one. In this case, type 2 in cell A1 and press Return. Instantly *1-2-3* displays the value 8 in cell C1, and the value 12 in cell C2. The underlying formulas in C1 and C2 are still +A1+A2 and +A1*A2, respectively. The formulas perform their calculations using the current values of cells A1 and A2, no matter how often you change the values in those cells.

The formulas in cells A3 and A4, however, haven't changed. You entered those formulas using values rather than cell references. The formulas continue to calculate a result based on the values they contain.

ON YOUR OWN

This article has provided the barest overview of *1-2-3*. Understanding the spreadsheet's layout and knowing how to move the cell pointer around the worksheet are important if you're going to apply *1-2-3* to your business functions. But simply reading about the spreadsheet usually can't provide the solid understanding of spreadsheet concepts that you need to be most effective.

Review what we've covered here between now and the next installment of this column. Better still, poke around on your own or work through the first chapter of the "How to" section of the *1-2-3* documentation.

Join us for future columns. You'll learn about different types of cell entries and use *1-2-3*'s menus to explore tools you'll use repeatedly to create the spreadsheets that will help you do your work. Above all, experiment. You can be productive with the little we've explored so far, but there's plenty more to know. ■

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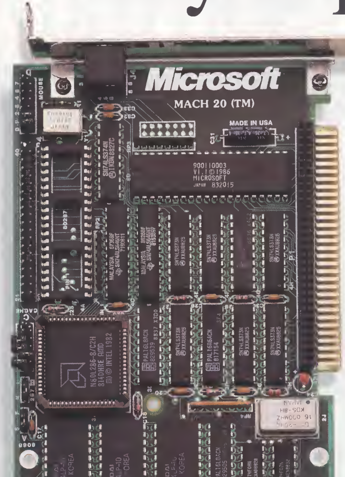

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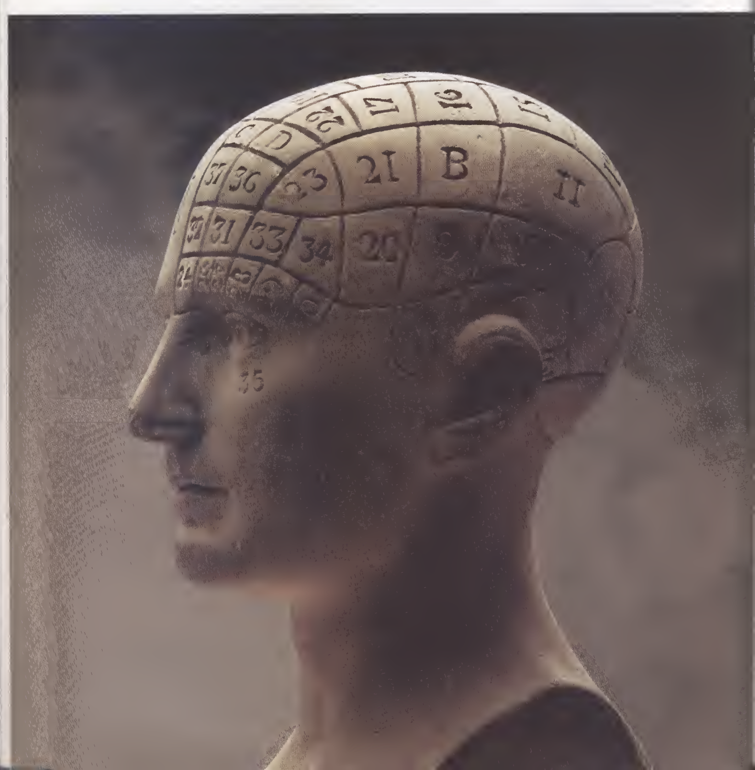

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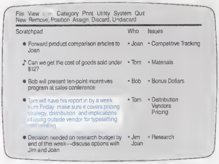

```
File  View  Item  Category  Print  Utility  System  Quit
New  Remove, Position  Assign, Discard, Undiscard
Scratchpad                                     Who     Issues

 • Forward product comparison articles to     • Joan  • Competitive Tracking
   Joan

 ♪ Can we get the cost of goods sold under    • Tom   • Materials
   $12?

 • Bob will present ten-point incentives      • Bob   • Bonus Dollars
   program at sales conference

 • Tom will have his report in by a week      • Tom   • Distribution
   from Friday  make sure it covers pricing             Vendors
   strategy, distribution  and implications             Pricing
   of using outside vendor for typesetting
   and printing

 • Decision needed on research budget by      • Jim   • Research
   end of this week--discuss options with      Joan
   Jim and Joan
```

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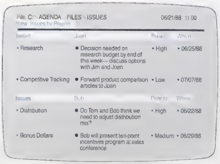

```
File. C:\AGENDA\FILES\ISSUES                          06/21/88  11 00
View  Issues by Person
Issues                 Joan                          Priority   When

• Research             • Decision needed on           • High    • 06/25/88
                         research budget by end of
                         this week--- discuss options
                         with Jim and Joan

• Competitive Tracking • Forward product comparison   • Low     • 07/07/88
                         articles to Joan

Issues                 Bob                           Priority   When

• Distribution         • Do Tom and Bob think we      • High    • 06/22/88
                         need to adjust distribution
                         mix?

• Bonus Dollars        • Bob will present ten-point   • Medium  • 06/29/88
                         incentives program at sales
                         conference
```

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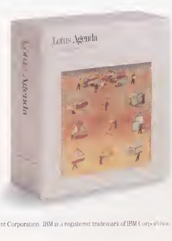

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SYMPHONY MACROS

TWO-WAY WHAT-IF TABLES

Blow away *Symphony*'s What-If 2-Way command.

BY DANIEL GASTEIGER

Symphony's What-If command can really slow you down. This statement may seem outrageous, considering that the What-If command rapidly generates huge tables of values based on any collection of formulas in the worksheet. Unfortunately, when you issue the Range What-If command, *Symphony* recalculates the worksheet once for every value the command generates. When you generate a what-if table in a formula-laden worksheet, you can wait hours for *Symphony* to finish its task.

Last month's column presented a macro that uses the @INDEX function and the {PUT} and {FOR} commands to generate one-way what-if tables. That column explained how the macro can outperform the What-If command under certain circumstances. This month's column builds on that discussion to create macros that generate two-way what-if tables.

WHAT'S A WHAT-IF TABLE?

A two-way what-if table is a range that is bounded by values in its leftmost column and topmost row. The top-left cell of the range contains a formula that relies in some way on the contents of at least two other cells. The What-If 2-Way command pairs values from the table's leftmost column and top row. The command substitutes the paired values into the formula's calculations, then records the result at the point in the table that coincides with the paired values.

The What-If 2-Way command is easiest to explain with a simple example. Range A15..D20 of figure 1 contains a two-way what-if table.

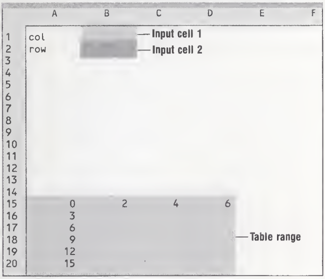
Create the spreadsheet by entering the labels and values as shown, except instead of 0 enter the formula +B1+B2 into cell A15. When you issue the Range What-If 2-Way command, *Symphony* will use this formula to calculate the sums of each value in column A of the table, paired with each value in row 15.

Select MENU Range What-If 2-Way, and indicate range A15..D20 as the Table range. *Symphony* prompts you for Input cell 1, which is the cell into which the What-If command will substitute values from the table's leftmost column. In this case, indicate cell B1. Then indicate cell B2 as Input cell 2, which is the cell into which the What-If command substitutes values from the table's top row. Almost instantly, *Symphony* completes the what-if table. It should appear as shown in figure 2.

Cell B16 of the table now contains the value 5. This is the result of the table's formula when cell B1 contains the value 3 (from the table's leftmost column) and cell B2 contains the value 2 (from the table's top row). Similarly, cell C17 contains the value 10, the result of the table's formula when cell B1 contains 6 and cell B2 contains 4.

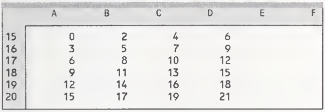
THE WHAT-IF MACRO

The What-If command is fast. Even on the slowest computer, you'd wait but a second for *Symphony* to calculate the table in the previous example. However, as your



	A	B	C	D	E	F
1	col					
2	row					
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15	0	2	4	6		
16	3					
17	6					
18	9					
19	12					
20	15					

FIGURE 1



	A	B	C	D	E	F
15	0	2	4	6		
16	3	5	7	9		
17	6	8	10	12		
18	9	11	13	15		
19	12	14	16	18		
20	15	17	19	21		

FIGURE 2

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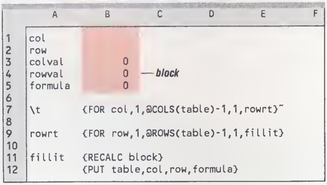
*Lotus 1-2-3 is a registered trademark of Lotus Development Corporation worksheet becomes more complex, the What-If command becomes less efficient.

Last month's column presented an exercise to show how data tables suffer in large worksheets. Enter the formula @RAND^3 into cell A23, and copy it to range A23..G200. If you use a computer driven by an 80386 microprocessor, copy the formula to range A23..G500, erase range B16..D20, and reissue the Range What-If 2-Way command. Depending on your computer, you can wait close to 3 minutes for *Symphony* to fill the table.

The macro in figure 3 suffers negligible losses in speed in large worksheets.



```
         A          B            C            D            E         F
1   col
2   row
3   colval              0
4   rowval              0  —block
5   formula             0
6
7   \t         {FOR col,1,@COLS(table)-1,1,rowrt}~
8
9   rowrt      {FOR row,1,@ROWS(table)-1,1,fillit}
10
11  fillit     {RECALC block}
12             {PUT table,col,row,formula}
```

FIGURE 3

To create the macro, first set *Symphony* for manual recalculation: Select MENU Settings Recalculation Method Manual Quit. Then erase range B16..D20 and cell A15, and enter the labels shown in ranges A3..A5 and A7..B12 of figure 3. Remember to begin the entry in cell A7 with an apostrophe label prefix.

Assign the labels in column A as names for the adjacent cells of column B: Select MENU Range Name Labels Right, and indicate range A1..A11. Also, assign the name *block* to range B1..B5: Select MENU Range Name Create, enter *block*, then indicate the range. Use the same commands to assign the name *table* to range A15..D20. Finally, enter the following formulas in the cells indicated:

Cell	**Formula**
B3	@INDEX(table,col,0)
B4	@INDEX(table,0,row)
B5	+colval+rowval

The macro is ready to run. To make a fair comparison of the macro's speed with that of the What-If command, return to automatic recalculation: Select MENU Settings Recalculation Method Automatic Quit. Then hold down the MACRO key (Alt on most computers) and press T. The macro generates the table in moments under the same circumstances that slowed the What-If command to a crawl. Never mind that the formulas in *block* return ERR.

HOW IT WORKS

Despite the macro's brevity, it's quite complex and difficult to explain. To best understand the macro, first consider the cells in the range named *block* (B1..B5). The macro uses these cells to calculate which values will appear in the table.

The cells named *colval* (B3) and *rowval* (B4) contain @INDEX formulas that return values from the leftmost column and top row of the table. The @INDEX function has the syntax @INDEX(*table*,*col*,*row*), where *table* identifies a range of cells and *col* and *row* represent displacement from the top-left cell in *table*.

For example, the formula @INDEX(table,0,2) returns the value that is zero columns to the right of the leftmost column and two rows down from the topmost row of *table* (cell A17 in this worksheet).

The row-displacement argument of the @INDEX function in *colval* is 0. This lets the formula return values only from the top row of *table*. The formula's *col* argument refers to the cell named *col*. The value of *col* determines which value *colval* returns from the table's top row.

To see the formula in action, first erase the formulas in range A23..G200 (or A23..G500 if you followed instructions for users of '386-based computers). Then move the cell pointer to *col* (cell B1) and enter 1. *Colval* immediately returns 2, which is the value that is one cell to the right of the top-corner cell in *table*. Enter 2 in *col* and *colval* returns 4; enter 3 and *colval* returns 6. When the value of *col* identifies a column outside of *table*, the @INDEX formula in *colval* returns ERR.

The @INDEX formula in *rowval* returns values from the left column of *table*. Move the cell pointer to *row* (cell B2) and enter 1; *rowval* returns 3. Enter 2 and *rowval* returns 6, enter 3 and *rowval* returns 9, and so on.

The formula in the cell named *formula* sums the values of *colval* and *rowval*. You can vary the values of *col* and *row* to make *formula* sum any two values paired from the left column and top row of *table*. The macro manipulates *col* and *row* just as you did, as it generates the what-if table. Here's how it works:

{FOR col,1,@COLS(table)−1,1,rowrt}~ processes a FOR loop. This {FOR} command processes the routine named *rowrt* once for column B of the table, a second time for column C, and a third time for column D. With each processing of the *rowrt* routine, the {FOR} command changes the value of *col*. On the first pass *col* becomes 1, on the second pass *col* becomes 2, and on the third pass *col* becomes 3. When the {FOR} command has processed *rowrt* three times, the macro presses Return to update the worksheet, and the macro ends.

{FOR row,1,@ROWS(table)−1,1,fillit} processes a second FOR loop. This {FOR} command processes the routine named *fillit* once for each of the last five rows of *table*. The value of *row* changes with each processing of *fillit*. On the first run *row* becomes 1, on the second run it becomes 2, and so on. Processing *fillit* five times ends this {FOR} command and therefore ends the current pass of the previous {FOR} command.

{RECALC block} updates the formulas in range B1..B5 based on the new values of *col* and *row*.

{PUT table,col,row,formula} copies the value of *formu-*

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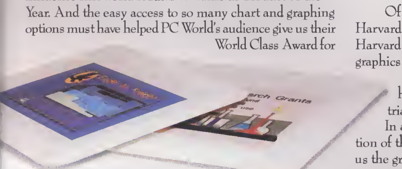

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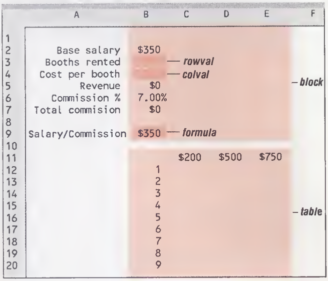
la into *table* at the location identified by the values of *col* and *row*. When *col* is 1 and *row* is 1, the {PUT} command copies the value of *formula* to cell B16; when *col* is 1 and *row* is 2, the macro copies *formula* to cell B17, and so on.

In summary: The first FOR loop changes the value of *col*. For each change in *col*, the second FOR loop changes the value of *row* five times. For each change in *row*, the macro recalculates the formulas and copies the result of *formula* into the Table range.

CREATING MORE USEFUL MODELS

You don't need to understand the macro perfectly to apply it in your own worksheets. In fact, you can easily adapt the macro to work with any preexisting two-way what-if table.

In your worksheets the cell named *colval* takes the place of Input cell 1, and the cell named *rowval* takes the place of Input cell 2. *Formula* should contain the formula that you would typically put in the what-if table's top-left corner. Figure 4 shows a worksheet in which you might use the macro:



	A	B	C	D	E	F
1						
2	Base salary	$350				
3	Booths rented					
4	Cost per booth					
5	Revenue	$0				
6	Commission %	7.00%				
7	Total commision	$0				
8						
9	Salary/Commission	$350				
10						
11			$200	$500	$750	
12		1				
13		2				
14		3				
15		4				
16		5				
17		6				
18		7				
19		8				
20		9				

FIGURE 4

This worksheet calculates a salesperson's weekly salary and commission on the sales of booth space at a trade show. There are three booth sizes, renting for $200, $500, and $750, respectively.

In a given week Mei Ling receives $350 plus 7% of the revenue she generates from booth sales. This worksheet helps her to decide whether it's better to sell a few of the high-priced booths or many of the lower-priced ones.

To create the model, start in a blank worksheet and set the width of column A to 17: Select MENU Width Set and enter 17. Then enter the labels shown in column A, beginning each of the entries with a quotation-mark label prefix so that the labels will be right-aligned. Enter the values shown in cells B2 and B6, typing the percentage in cell B6 as a decimal amount (.07). Then enter the following formulas in the cells indicated:

Cell	Formula
B5	+B4*B3
B7	+B6*B5
B9	+B7+B2

Enter the values shown in range B11..E20, then assign a currency format with no decimal places to ranges B2, B4..B5, B7..B9, and C11..E20. For example, to format range B2..B5, select MENU Format Currency, enter 0, and indicate the range. Assign a percent format with two decimal places to cell B6.

With this model Mei Ling guesses how many booths of a given price she'll rent and enters that number in cell B3. Likewise, she enters the price per booth into cell B4. Her projected earnings for the week appear in cell B9.

The data table in range B11..E20 lists booth prices in its top row and projected numbers rented in its leftmost column. Mei Ling wants to fill in the table with her projected weekly earnings for each *Booths rented* value paired with each *Cost per booth* value. This is where the macro comes in.

To create the macro in this worksheet, enter the label *row* in cell E1 and the label *col* in cell E2. Then copy the macro from range A7..B12 of figure 3 into this worksheet, starting in cell E4. Except for its location in the worksheet, the macro should be identical to the one you created earlier.

Assign the labels in column E as names for the adjacent cells of column F, then assign the following range names:

Range name	Address
rowval	B3
colval	B4
block	B1..E9
formula	B9
table	B11..E20

Finally, enter the formula @INDEX(table,0,row) into cell B3 and the formula @INDEX(table,col,0) into cell B4.

The macro is ready to go. Hold down the MACRO key and press T. In moments *Symphony* completes the what-if table. Again, several formulas in column B will return ERR, but these don't affect later use of the model. Simply erase the cells named *row* and *col* and you'll eliminate the ERRs.

From the results of the table, you can see that Mei Ling must sell four booths at $200 to earn as much as she would on the sale of a single booth at $750.

SOME IMPORTANT TIPS

When you adapt this macro to other models, choose cells to name *colval* and *rowval* as you would choose Input cells for the What-If 2-Way command. Into these cells enter @INDEX formulas that refer to the cells named *row* and *col* and to the range named *table*. Assign the name *formula* to the cell that calculates the values you wish to store in the what-if table.

Perhaps most important in adapting the macro is to make sure that the range named *block* encompasses all the formulas involved in determining the value of *formula*—including the cells named *row*, *col*, *rowval*, and *colval*. If this isn't the case, the macro may generate incorrect table values.

The macro uses rowwise recalculation to determine table values. Consequently, try to structure models with the cells named *row* and *col* at the top, followed by *rowval* and *colval*. All other formulas involved in calculating table values should fall between these first four cells and the cell named *formula*.

If you can't create or restructure your worksheet to match this arrangement, add a repeat count to the macro's {RECALC} command. For example, to ensure generating correct table values, change the {RECALC} command to read {RECALC block,0,3}. This forces *Symphony* to recalculate the formulas in *block* three times for each table value generated—still a remarkable time savings over recalculating every formula in a large and complex worksheet. ■

Some Useful Conventions

Our examples use uppercase letters for macro commands and lowercase letters for range names and addresses used by macros, as in {BRANCH input}. Whenever possible, range names appear to the left of the named cells. This helps to identify named cells. Remember, when you enter macro steps that start with a slash (/), a label-prefix character such as a backslash (\\), or any arithmetic operators (+ , − , *, etc.), place an apostrophe (') before the entry or you may get unexpected results.

Why Use Range Names?

When you type a command as a label, cell references within the command are meaningless to *Symphony* until it processes the macro. For example, if your macro uses the command {MENU}Cb3~h20~ to copy information from a table and you move the table to another part of the worksheet, your macro no longer copies the proper information. If, however, the cells are named *source* and *destination* and the macro command is {MENU}Csource~destination~, moving the table containing these cells does not adversely affect the macro. It's much easier to edit a worksheet later if you've used range names instead of cell references in your macro code. —*D. G.*

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@WORK

A PAUPER'S NOTEPAD

Use this *1-2-3* Release 2/2.01 macro to annotate cell entries.

BY NICHOLAS DELONAS

For several tens of dollars you can buy an add-in program that helps you annotate cells in your worksheets. Such add-ins let you attach explanatory notes to cells, then review the notes when you want a reminder of the logic behind the cells' contents. Our macro does the same thing, but with an added benefit: It's free. So before spending your hard-earned money for an add-in, try our pauper's notepad macro for documenting your worksheets. The idea for this macro was submitted by Jeff Daskin, an assistant professor in the Department of Finance and Economics in the School of Management at Boston University.

To create the macro, start in a blank worksheet and adjust the column widths. To do this, move the pointer to each of the appropriate columns, press slash, select Worksheet Column Set-Width, and enter the widths as follows: A–6, B–8, C–14, D–14, and E–14. Enter the labels as shown in the figure on the next page, but for the moment leave out the entries shown in red. Notice that the words *Address* and *Note* are separate labels in cells B43 and C43 and that the label *Address* appears in both cells B5 and C5. Use the Range Name Labels Right command to assign the labels in column A as range names for the adjacent cells of column B. Then assign range names as indicated in the range-name table. Finally, enter the formulas that are listed in the formula table.

TABLES

RANGE NAMES

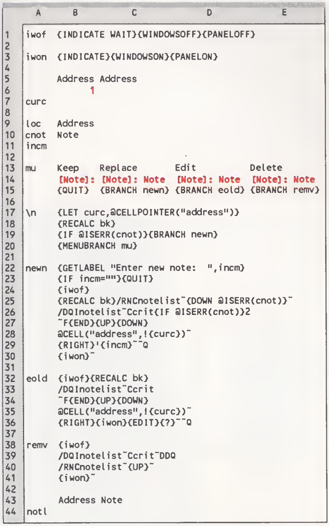
Name	Range
bk	B5..E14
crit	B5..B6
crit2	C5..C6
notelist	B43..C43

FORMULAS

Cell	Formula
B6	+notl=$curc
B9	@VLOOKUP(curc,notelist,0)
B10	@VLOOKUP(curc,notelist,1)
B14	+"[Note]: "&$cnot
C14	+"[Note]: "&$cnot
D14	+"[Note]: "&$cnot
E14	+"[Note]: "&$cnot

To run the macro, move the pointer to any cell that

GREG DEARTH



```
    A     B         C              D              E
 1  iwof  {INDICATE WAIT}{WINDOWSOFF}{PANELOFF}
 2
 3  iwon  {INDICATE}{WINDOWSON}{PANELON}
 4
 5        Address Address
 6              1
 7  curc
 8
 9  loc   Address
10  cnot  Note
11  incm
12
13  mu    Keep    Replace        Edit           Delete
14        [Note]: [Note]: Note   [Note]: Note   [Note]: Note
15        {QUIT}  {BRANCH newn}  {BRANCH eold}  {BRANCH remv}
16
17  \n    {LET curc,@CELLPOINTER("address")}
18        {RECALC bk}
19        {IF @ISERR(cnot)}{BRANCH newn}
20        {MENUBRANCH mu}
21
22  newn  {GETLABEL "Enter new note:  ",incm}
23        {IF incm=""}{QUIT}
24        {iwof}
25        {RECALC bk}/RNCnotelist~{DOWN @ISERR(cnot)}~
26        /DQInotelist~Ccrit{IF @ISERR(cnot)}2
27        ~F{END}{UP}{DOWN}
28        @CELL("address",!{curc})~
29        {RIGHT}'{incm}~~Q
30        {iwon}~
31
32  eold  {iwof}{RECALC bk}
33        /DQInotelist~Ccrit
34        ~F{END}{UP}{DOWN}
35        @CELL("address",!{curc})~
36        {RIGHT}{iwon}{EDIT}{?}~~Q
37
38  remv  {iwof}
39        /DQInotelist~Ccrit~DDQ
40        /RNCnotelist~{UP}~
41        {iwon}~
42
43        Address Note
44  notl
```

you would like to annotate. Hold down the MACRO key (Alt on most computers) and press N. Type a brief note in response to the prompt, and press Return. *1-2-3* will accept notes as long as 240 characters. However, you will not be able to read a note of more than 70 characters. If you decide not to enter a note, press the Escape key.

If you've already annotated the current cell when you run the macro, *1-2-3* displays the note as a long prompt under a menu that offers four options: Keep, Replace, Edit, and Delete. Select Keep to leave the original note as it appears. Select Replace to erase the old note and enter a new one. Select Edit to alter the original note, and select Delete to remove the note altogether. Pressing Escape has the same effect as selecting Keep from the menu.

You can use this macro in any worksheet. However, be careful that the macro's range names aren't the same as any range names the worksheet might have. Also, put the macro out of the way; don't make any cell entries below the range named *notelist*, which contains the cell notes, because that range expands downward as you add notes. ■

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BY DONALD ROCHE JR.

HELP FROM HAL

More than a conduit for English sentences, *Lotus HAL* can assist you in all phases of building and using worksheets.

An enhancement program for *1-2-3, Lotus HAL* derives its name from the term Human Access Language. Because the name Hal stirs up memories of the verbose computer in *2001: A Space Odyssey*, many people think of *Lotus HAL* as merely a program that understands English. Indeed, *HAL* makes *1-2-3* less intimidating by allowing you to issue commands in English rather than search through a maze of menus. Unfortunately, the natural-language aspect of the program overshadows some of *HAL*'s other valuable functions.

Before looking at these and other examples of how *HAL* simplifies and enhances *1-2-3* operations, we need to define a couple of terms. First, the phrase *enter the HAL request* or *enter the request* means that you should press the backslash key (\) to display *HAL*'s request box, type the command shown in italics, and press Return. However, if you choose to keep the request box on the screen by entering the request *stay*, you need not begin requests by typing backslash. Just enter the text indicated.

Second, *table* refers to a rectangular area bounded by two or more blank rows or columns or by the worksheet border. The *current table* is the area of the spreadsheet that contains the cell pointer. In *HAL* requests, you can refer to the current table as *this*. You should always position the cell pointer within the range of the table to which a request refers. When the request box is on the screen, you can use the TABLE key (F8 on most computers) to highlight the current table. So much for semantics. Let's see how *HAL* speeds building and using worksheets.

DISASTER RELIEF

One of *HAL*'s most useful features lets you undo, or reverse, your most recent action. If you accidentally select /Worksheet Erase Yes, *HAL* can recover your worksheet, provided you have not subsequently issued a *HAL* request or *1-2-3* command. Press the Undo key (Backspace) and the worksheet reverts to the form it had prior to the last operation. Press the Undo key again to undo what you just undid. You can also press backslash and enter the request *undo* to accomplish the same task.

Note that you cannot undo the following operations:

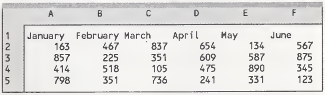
- *1-2-3* commands that affect disk files, including /File Save, /File Xtract, /File Erase, and /Graph Save and their *HAL* equivalents
- The *1-2-3* print operations /Print Printer Line, /Print Printer Page, /Print Printer Go, /Print File Line, /Print File Page, or /Print File Go, and their *HAL* equivalents
- *HAL* requests *stay, go away, undo off, undo on*
- *1-2-3* commands /File Directory, /Worksheet Global Default Directory, /Worksheet Global Default Update
- DOS operations that you perform after issuing *1-2-3* Release 2/2.01's System command

During a *HAL* session, pressing Backspace results in a backspace rather than an Undo only when you are editing a cell entry, a response to a prompt during a *1-2-3* command, or a *HAL* request. We'll use Undo to reverse some *HAL* operations later.

BUILDING MULTIPLE-RANGE GRAPHS

HAL makes *1-2-3*'s graphing capability easy to use. Since *HAL* intuitively locates data, you do not have to specify the data ranges for the graph.

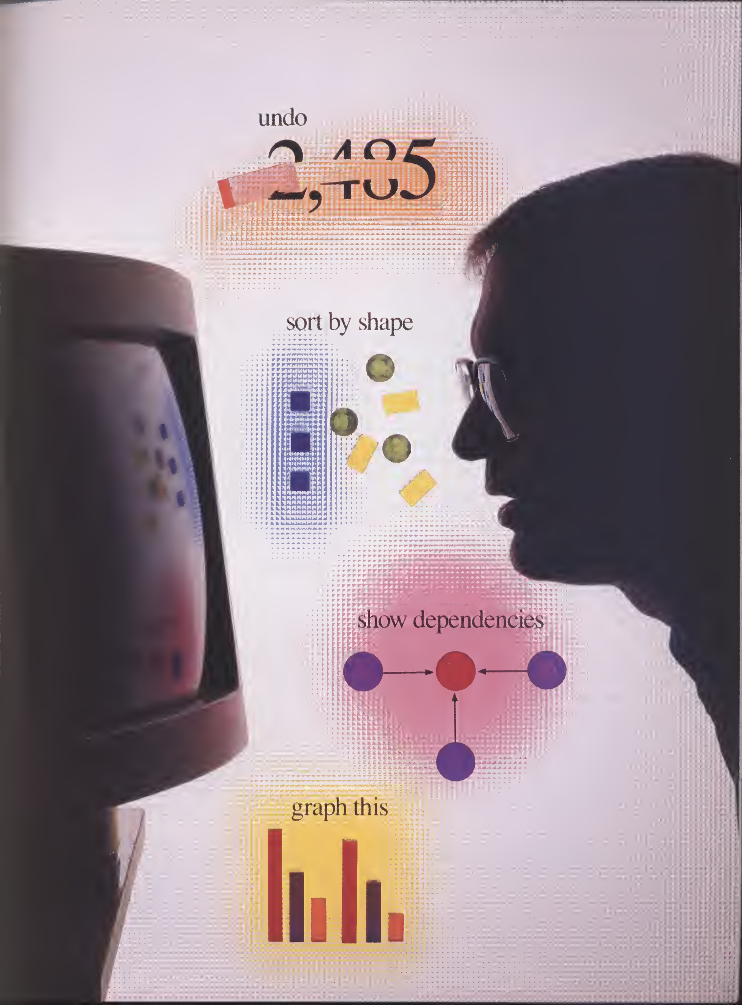
To learn to create graphs with *HAL*, set up the worksheet shown below. *HAL* can help with the month labels: Move the cell pointer to cell A1, and enter the request *put jan to jun across*. This request automatically puts the names of the first six months in range A1..F1. Note that you can shorten *HAL* commands by abbreviating words. For the sake of clarity, most *HAL* command sequences in this article use complete words. Enter the values shown. If the *HAL* request box is on the screen, enter the value and press the Insert key. If you like, you can clear the request box by pressing the Escape key. Then you can enter values as you would if you were using *1-2-3*.



	A	B	C	D	E	F
1	January	February	March	April	May	June
2	163	467	837	654	134	567
3	857	225	351	609	587	875
4	414	518	105	475	890	345
5	798	351	736	241	331	123

Place the cell pointer anywhere within range A1..F5, and enter the *HAL* request *graph this*. *HAL* creates a bar graph using the six columns of numbers as graph ranges A through F. If you don't want to graph all the tabular information, press Escape to return to the spreadsheet, and then tell *HAL* to graph only a portion of the data. For example, if you want to graph the contiguous data in col-

SKOLOS/WEDELL/RAYNOR


undo
2,485
sort by shape
show dependencies
graph this

umns A through C, enter the request *graph cols a to c*. If you want to graph data in rows 2 through 4 only, enter the request *graph A2..C4* to plot the data in ranges A2..A4, B2..B4, and C2..C4 as graph ranges A, B, and C.

You can tell *HAL* what to do in a variety of ways. The program has an extensive vocabulary and a list of action verbs that you must use to begin a request. For instance, you can use the following requests to create graphs with multiple data ranges:

graph col a to col c

plot row 2 to row 4 as line

view this as stacked bar

graph january to march

The last request, of course, works only when the column headings of the table are month names.

HASSLE-FREE DATABASE OPERATIONS

When it comes to sorting or querying a database, *HAL* offers a number of enhancements to *1-2-3* commands. When sorting, for example, *HAL* assumes that you want to sort the range of contiguous, nonblank cells that surround the current cell address. If you don't specify a column to sort, the program assumes that you want to sort the leftmost column. It automatically excludes field names from the sort operation.

Clear your worksheet by issuing the request *erase all* and then press Y. Set the widths of the first seven columns to 12 by issuing the request *widen cols a to g to 12*. Enter all the labels and values shown in figure 1. Make sure the cell pointer is in range A1..G7. Capitalize the labels, and format the values for currency with no decimal places with the command: *proper this then format this to currency 0*. We will use this worksheet for the remaining examples in this article.

Let's consider sorting a database alphabetically by last name without using *HAL*. You would have to select /Data Sort Data-Range, specify a range as the Sort range, select Primary-Key, specify a cell, type *a* in response to the prompt *Sort Order (A or D)*, and select Go.

HAL simplifies this process. To sort the database in figure 1 alphabetically by last name, place the cell pointer anywhere within the table and enter the terse request *sort*. The program automatically specifies range A2..G7 as the data range and range A1..G7 as the primary sort key (which is the same as designating the leftmost column), sets the sort to ascending order, and selects Go to sort the range. You can specify one or two sort keys of your choosing. Enter the request *sort this by territory ascending by qtr1 sales descending*, and the program rearranges the records accordingly.

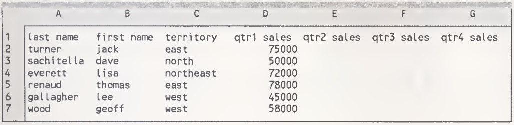
HAL also makes it easier to extract records from a database. Look at figure 1. Suppose you want to list the people whose first-quarter sales exceeded $70,000. Issue the request *extract qtr1 sales > 70000* to create the list. The program designates range A1..G7 as the Input range, copies row 1 to row 10, designates range A10..G11 as the Criterion range, enters the formula +D2>70000 in cell D11, copies row 1 to row 15, designates range A15..G15 as the Output range, and performs the extract operation. This places the records for Renaud, Turner, and Everett in rows 16, 17, and 18, respectively. Press Undo (Backspace) to get rid of the Criterion and Output ranges.

You can delete records in the same way. To delete records with first-quarter sales of less than $50,000, request *delete qtr1 sales < 50000*. *HAL* asks you to verify whether you want to delete records; do this by pressing Return. The program creates a Criterion range in range A10..G11, enters the formula +D2<50000 in cell D11, and deletes the record for Gallagher. Press Undo again to restore the Gallagher record and to eliminate the Criterion range.

MAKING PROJECTIONS

HAL lets you create formulas that project values based on a specified rate of increase or decrease. With the cell pointer anywhere within the Table range of our worksheet, enter the request *project qtr1 sales by 12%*. This places the formula +D2*1.12 in cell E2 and copies the formula to range E3..E7. If you want projected values in more than one column, add the word *across* to the end of your request. You can do this without retyping the request. Make sure the request box is on the screen and press the REVIEW BACKWARD key (F3). The last request you entered appears in the request box. Press the Spacebar, then type *across* and press Return. The formulas in column E are copied into columns F and G.

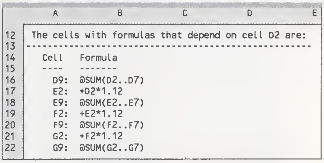
You can also project values from row to row. Suppose you're working with a spreadsheet that lists the months of the year in range A1..A12, and you've entered values for January sales in row 1. To see the values for the remainder of the year, given a 5% decrease in sales, you would enter the request *project jan by −5% down*. This fills the cells in remaining rows with formulas that multiply the cells immediately above them by 0.95.



```
        A           B           C           D           E           F           G

1  last name   first name  territory   qtr1 sales  qtr2 sales  qtr3 sales  qtr4 sales
2  turner      jack        east             75000
3  sachitella  dave        north            50000
4  everett     lisa        northeast        72000
5  renaud      thomas      east             78000
6  gallagher   lee         west             45000
7  wood        geoff       west             58000
```

FIGURE 1. Use this partially completed database to work through most of the examples in the article. You'll use *HAL* commands to capitalize letters, create projected-sales formulas for the last three quarters, total the columns of values, and examine the relationships between formulas.



```
        A          B          C          D          E
12 | The cells with formulas that depend on cell D2 are:
13 | ---------------------------------------------------
14 |   Cell   Formula
15 |   ----   -------
16 |     D9:  @SUM(D2..D7)
17 |     E2:  +D2*1.12
18 |     E9:  @SUM(E2..E7)
19 |     F2:  +E2*1.12
20 |     F9:  @SUM(F2..F7)
21 |     G2:  +F2*1.12
22 |     G9:  @SUM(G2..G7)
```

FIGURE 2. The *HAL* command *list dependencies* produces this table. *HAL* can also highlight cells whose formulas depend on the value in a specified cell. *List dependencies* is an audit request. Auditing a worksheet helps you understand its design and detect errors.

CONVERTING CELL ENTRIES

HAL can convert a single column of values to labels, a single column of labels that look like numbers to values, or a range of formulas to values. This saves you time because you don't have to reenter data or enter @STRING or @VALUE formulas. Enter a request that begins with *convert* and specify a range that contains formulas, and *HAL* converts the formulas to values. Enter the request *convert cols e to g*. Move the cell pointer to cell E2. The entry in the control panel is *87360* instead of +D2*1.12.

Now try converting values to labels. Enter the request *convert qtr1 sales to labels*. All the numbers in range D2..D7 change to labels; they're left-aligned in their cells, and the dollar signs and commas are gone. Press Undo to change these labels back to values.

Before working through the next examples, you must change the entries in columns E through G back to formulas. You can't use Undo, however, because you've entered another request since converting these formulas to values. Instead, enter the request *project qtr1 sales by 12% across*. Also enter the request *total this*, which places a dividing line and an @SUM formula under all the sales columns.

ON THE AUDIT TRAIL

Auditing a spreadsheet means verifying that the data, formulas, and relationships among worksheet cells are correct. *HAL*'s auditing functions help you see the relationships among worksheet elements and your worksheet's underlying structure. When you make an audit request, the program analyzes either the entire worksheet or a specified part of it and lists or highlights one of the following:

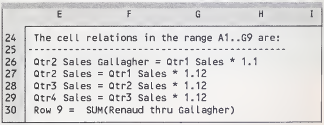
- Cells containing formulas
- Dependencies—cells whose values would change if you changed the value of a particular cell (the current cell or a cell named in the request)
- Precedents—cells that if changed would change the value of a particular cell (the current cell or cell named in the request)
- Relations—all possible formula relationships in the worksheet or in a specified range (which can only be listed, not highlighted)

Move the cell pointer to cell D2 and enter the request *highlight dependencies*, which highlights all cells whose values depend on D2's current value. These are ranges E2..G2 and D9..G9. *HAL* assigns unprotected status to the dependent cells so that the entries in those cells appear intensified or in a contrasting color.

With the cell pointer still on cell D2, enter the request *list dependencies*. The table shown in figure 2 appears in your worksheet. Since you didn't specify a location from the audit table, *HAL* placed it three rows below the table that contains cell D2.

Position the cell pointer within range A1..G8, and enter the request *unhighlight this* to return all cells dependent on cell D2 to their original status. Then enter the request *highlight precedents to g9*. This highlights every cell in range D2..G7, since changing any of these cells would affect the value in cell G9. Enter the request *list precedents to g9*. *HAL* displays a message that part of the sheet will be overwritten. Press Escape once to clear this message, then press the Spacebar and add *at a24* to the request you've already entered. A table appears in the spreadsheet starting at cell A24. It shows the cells that precede cell G9, along with their contents.

Before going on, let's introduce an error into the spreadsheet so that you can see how useful auditing functions can be. Edit the formula in cell E7 so that it reads +D7*1.1. Then enter the request *list relations at E24*. The following table appears on your screen:



```
        E          F          G          H          I
24 | The cell relations in the range A1..G9 are:
25 | ---------------------------------------------
26 | Qtr2 Sales Gallagher = Qtr1 Sales * 1.1
27 | Qtr2 Sales = Qtr1 Sales * 1.12
28 | Qtr3 Sales = Qtr2 Sales * 1.12
29 | Qtr4 Sales = Qtr3 Sales * 1.12
30 | Row 9 =  SUM(Renaud thru Gallagher)
```

The table shows that sales for each of the second, third, and fourth quarters are equal to the previous quarter multiplied by 1.12. Cell E26, however, contains a different formula. The fact that this formula differs from the others may indicate an error. Correct the error by copying cell E6 to cell E7. With the request box on the screen, press the REVIEW BACKWARD key (F3) and Return to reissue the request *list relations at E24*. *HAL* displays a message that the request will overwrite data. Press Return. The program places a new table at cell E24. The entry *Qtr2 Sales Gallagher = Qtr1 Sales * 1.1* is now gone.

By now you see that *HAL* does much more than translate Pidgin English into *1-2-3* commands. Get to know all of *HAL*'s capabilities, and you will be rewarded with increased productivity and enhanced *1-2-3* functionality. ■

Donald Roche Jr. is a software developer for Lotus Development Corp.

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REAL ESTATE CLOSING STATEMENTS IN A JIFFY

BY CHARLES E. MCCLELLAN

Use your spreadsheet to create and print a neat, accurate closing statement as fast as you can enter a dozen values.

Real estate professionals and lawyers specializing in real estate are being hit with a one-two punch in the paperwork department. At a time when the demand for residential mortgages is up, the secondary mortgage industry is demanding more documentation from the real estate industry. Of the many forms that must be prepared and submitted to banks and government agencies, one of the more troublesome is the closing statement. The person responsible for preparing the closing statement may not get all the necessary documents and numbers until shortly before the closing date and may wind up preparing it at the last minute.

You can speed up and simplify the preparation of your closing statements by producing them with *1-2-3* or *Symphony*. With the spreadsheet you can make last-minute changes and reduce the chance of prorating errors and other mathematical miscalculations. After you create one version to use when you represent buyers, you can easily modify it to create a second version to use when representing sellers.

Figure 1 shows the upper half of either the "buyer" or the "seller" worksheet. This section identifies the parties and the dates pertinent to the closing calculations. It also calculates the balance due to the seller, taking into account all the charges and credits between the buyer and the seller.

Figure 2 shows the lower half of the worksheet you use when preparing a statement for buyers. It contains formulas that calculate the amount of personal funds the buyer needs at the closing, signature lines where the buyers and sellers indicate acceptance, and additional values and formulas whose results are not included in the printed closing contract but are necessary for prorating calculations and for calculating transfer taxes.

Figure 3 shows the section of the seller worksheet that differs from the buyer worksheet. The formulas in this section compute the amount that will be taken home by the seller after deducting payouts to third parties such as brokers, existing lenders, attorneys, and surveyors.

Note that some of the assumptions in the example spreadsheets are specific to the State of Illinois. In other areas, for example, the cost of the survey may be the responsibility of the buyer rather than the seller.

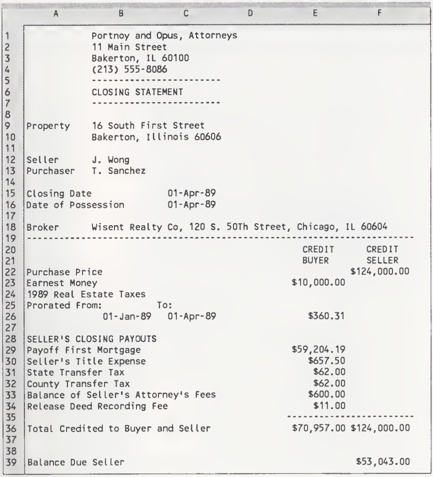
To build the template, follow the instructions in the "How to Set Up the Worksheets" box.

HOW THE TEMPLATE WORKS

The worksheet shown in figures 1 and 2 is used by the hypothetical law firm of Portnoy and Opus. P&O is representing T. Sanchez, who is buying a property on South First Street in Bakerton, currently owned by J. Wong. Sanchez and Wong and Wong's broker, Wisent Realty, have

CARY HENRIE

FIGURE 1. The article describes two worksheets: one to use when representing buyers of real estate, and one to use when representing sellers. The upper half of either worksheet is shown here. It contains areas for listing the participants in the transaction and the amounts that are credited to the buyer and to the seller.



```
       A            B            C          D           E            F
1              Portnoy and Opus, Attorneys
2              11 Main Street
3              Bakerton, IL 60100
4              (213) 555-8086
5              -----------------------
6              CLOSING STATEMENT
7              -----------------------
8
9  Property    16 South First Street
10             Bakerton, Illinois 60606
11
12 Seller      J. Wong
13 Purchaser   T. Sanchez
14
15 Closing Date              01-Apr-89
16 Date of Possession        01-Apr-89
17
18 Broker      Wisent Realty Co, 120 S. 50Th Street, Chicago, IL 60604
19 ------------------------------------------------------------------------
20                                                    CREDIT     CREDIT
21                                                    BUYER      SELLER
22 Purchase Price                                              $124,000.00
23 Earnest Money                                    $10,000.00
24 1989 Real Estate Taxes
25 Prorated From:          To:
26               01-Jan-89   01-Apr-89                 $360.31
27
28 SELLER'S CLOSING PAYOUTS
29 Payoff First Mortgage                            $59,204.19
30 Seller's Title Expense                              $657.50
31 State Transfer Tax                                   $62.00
32 County Transfer Tax                                  $62.00
33 Balance of Seller's Attorney's Fees                 $600.00
34 Release Deed Recording Fee                           $11.00
35                                                ------------------------
36 Total Credited to Buyer and Seller               $70,957.00 $124,000.00
37
38
39 Balance Due Seller                                           $53,043.00
```

agreed to close the sale, with Sanchez to take possession of the property on April 1.

Rows 22 through 34 of the spreadsheet are used to record the amounts that are credited to each party. For example, the purchase price for the property is $124,000, which is credited to the seller and entered in cell F22. However, the buyer has already tendered $10,000 of earnest money. Since this will be deducted from the total purchase price, it is credited to the buyer and entered in cell E23.

The property tax, prorated for the portion of the year in which the seller owns the property, is calculated on row 26. The formula in cell B26 always returns the serial value for January 1 of the year in which the closing takes place (cell C15), and the formula in cell C26 repeats the value in cell C15. Cell E26 calculates the prorated tax. We'll look at the method for calculating property taxes later. Note that the entry in cell A24 is actually a string-returning formula whose result always refers to the year in which the closing date occurs. If you use *1-2-3* Release 1A, enter the label *1989 Real Estate Taxes* and change the label to reflect the appropriate year.

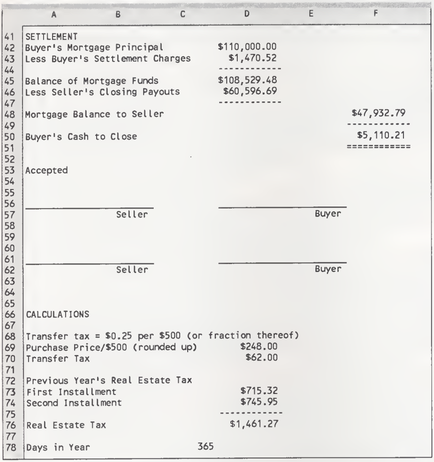
Rows 29 through 34 contain all of the seller's closing payouts, which are also credited to the buyer. The largest of these, in cell E29, is the balance the seller still owes on the mortgage. Most of these payouts are entered as values. Cells E31 and E32 contain formulas that repeat the result of the transfer-tax formula found in cell D70, which we'll examine later.

Formulas in cells E36 and F36 tally up the amounts due to the buyer and seller. The formula in cell F39 calculates the balance due to the seller by subtracting cell E36 from cell F36.

In figure 2 cell D42 shows the amount the buyer has borrowed from the bank or mortgage company. Cell D43 shows the buyer's settlement charges, and cell D45 subtracts the settlement charges from the mortgage principal. Cell D46 totals the amounts in the Seller's Closing Payouts section of figure 1. Cell F48 subtracts closing payouts from the balance of mortgage funds to determine the portion of the mortgage the seller receives after paying off the existing mortgage and other deductions. Cell F50 subtracts the mortgage balance to the seller (cell F48) from the balance due to the seller (cell F39) and indicates the amount the buyer must bring to the closing, in addition to the mortgage check.

Before we consider the Calculations section, let's look at the worksheet that Portnoy & Opus would use if they were representing the seller. It is identical to the buyer worksheet, except for rows 41 through 50. This section, shown in figure 3, lets the seller know how much he or she is entitled to after settling up with third parties, in this case the broker and the surveyor. Cell D42 simply repeats the value in cell E23, the earnest money.

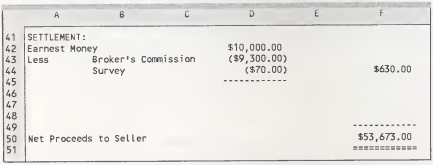
Cell D43 computes the broker's commission by multiplying the purchase price by 7.5% and converting the result to a negative number. You will probably want to enter a different formula in this cell, depending on the commission to which the broker in the transaction is entitled. Or you may wish to enter a simple value if the commission is not based on a percentage. Cell D44 contains the amount of the surveyor's fee, entered as a negative amount. Cell F44 adds these three values together. Final-



```
         A          B          C          D          E          F

41  SETTLEMENT
42  Buyer's Mortgage Principal       $110,000.00
43  Less Buyer's Settlement Charges    $1,470.52
44                                   ------------
45  Balance of Mortgage Funds        $108,529.48
46  Less Seller's Closing Payouts     $60,596.69
47                                   ------------
48  Mortgage Balance to Seller                                $47,932.79
49                                                           ------------
50  Buyer's Cash to Close                                      $5,110.21
51                                                           ============
52
53  Accepted
54
55
56  ____________________________     ____________________________
57                 Seller                                Buyer
58
59
60
61  ____________________________     ____________________________
62                 Seller                                Buyer
63
64
65
66  CALCULATIONS
67
68  Transfer tax = $0.25 per $500 (or fraction thereof)
69  Purchase Price/$500 (rounded up)       $248.00
70  Transfer Tax                            $62.00
71
72  Previous Year's Real Estate Tax
73  First Installment                      $715.32
74  Second Installment                     $745.95
75                                   ------------
76  Real Estate Tax                      $1,461.27
77
78  Days in Year                    365
```

FIGURE 2. This is the lower half of the "buyer" worksheet. Cell F50 calculates the amount the buyer must bring to the closing, in addition to the check from the mortgage lender. Rows 56 and 61 contain lines on which the buyers and sellers sign. Rows 69 through 78 contain additional values and formulas for calculating the values in the body of the closing statement; this section is not included in the Print range when printing the closing statement.



```
         A          B          C          D          E          F

41  SETTLEMENT:
42  Earnest Money                       $10,000.00
43  Less       Broker's Commission      ($9,300.00)
44             Survey                      ($70.00)                 $630.00
45                                      ------------
46
47
48
49                                                              ------------
50  Net Proceeds to Seller                                        $53,673.00
51                                                              ============
```

FIGURE 3. This is the section of the "seller" version of the worksheet that differs from the "buyer" version. Cell F50 calculates the amount the seller receives after meeting obligations such as paying the existing mortgage, the broker's commission, and the surveyor's fee.

ly, cell F50 adds cell F44 to the balance due to the seller (cell F39) to compute the seller's net proceeds.

THE TAX CALCULATIONS SECTION

Returning to figure 2, rows 69 through 78 contain formulas for calculating the transfer tax and the real estate tax. These formulas are based on Illinois tax laws; you'll need to determine how taxes are applied in your area and adjust the spreadsheet accordingly. The state transfer tax in Illinois is $.25 for every $500 or portion of $500 of the purchase price. The county tax is the same. Therefore, the formula in cell D69 divides the purchase price by 500 and rounds the value up to the next dollar (not to the nearest dollar). Cell D70 multiplies cell D69 by .25.

Rows 73 through 76 compute the previous year's real estate taxes. In many parts of Illinois, property taxes are assessed as of January 1 each year and billed in two installments during the following year. For example, property taxes for 1988 were assessed as of January 1988, but they will not be billed and payable until 1989. Therefore, the real estate sales contract in this example requires that property taxes for 1989 be prorated from January 1, 1989, until the closing date, based on the most recent tax bill (1988). Again, this will be handled differently in other states. The first installment (cell D73) and second installment (cell D74) amounts are entered values, and the formula in cell D76 adds the two together.

The formula in cell C78 calculates the number of days in the year in which the closing date falls; it starts with the value 365 and adds 1 if the closing date's year is a leap year. In figure 1 again, the formula in cell E26 uses cells D76 and C78 to calculate the prorated tax by subtracting cell B26 from cell C26 (or the first day of the year from the closing date), dividing the result by the total number of days in the year, and multiplying that result by the previous year's real estate tax.

Since the Calculations section is not part of your printed document, you can change it or add to it as you like. For example, if transfer taxes in your state are based on entirely different assumptions, calculate them in this section by using as many intermediate formulas as you need. Just make sure that any line items for transfer tax in the body of the closing statement use formulas that repeat the value of the cell containing the actual tax amount. You can also enter whatever values and formulas are necessary to compute the real estate tax. Be sure that the final result is in the cell named *tax*.

You may need to change the main body of the worksheet. If you must account for more categories in the Seller's Closing Payouts section, add more rows to the worksheet between rows 28 and 34. The formulas in row 36 will adjust automatically. In other areas of the worksheet, it may be necessary to change formulas.

After you've modified the worksheet for your area's real estate laws, enter the name, address, and phone number of your own firm in range B1..B4. Then define the print settings: In *1-2-3* select /Print Printer Range, specify the Print range, and select Options Other Unformatted Quit Quit. In *Symphony* select SERVICES Print Settings Source Range, specify the Print range, and select Page Breaks No Quit Quit. The Print range should include columns A through F and enough rows to include the second set of signature lines. Then save the worksheet so that these settings will be in effect when you retrieve and use the worksheet in the future. Note that if you add rows, you may want to use legal-size paper in your printer.

When you use the template, enter the appropriate labels in range B9..B13. Use the formula @DATE(*year, month,day*) to enter the closing date and the date of possession in cells C15 and C16. Enter the name of the broker in cell B18, and replace the values (but not the formulas) in columns D, E, and F with values specific to the transaction. ■

Charles E. McClellan is a certified public accountant and attorney practicing in Chicago with the law firm Martin, Craig, Chester & Sonnenschein.

HOW TO SET UP THE WORKSHEETS

WORKSHEET 1

1. Default settings

Format: Currency, 2
1-2-3: /Worksheet Global Format Currency, press Return
Symph: MENU Settings Format Currency, press Return, Quit

Column width: 12
1-2-3: /Worksheet Global Column-Width, enter 12
Symph: MENU Settings Width, enter 12, Quit

2. Cell formats

Format	Range
Date 1	C15..C16
Date 1	B26..C26
General	C78

For example, to set the format for range C15..C16, select

1-2-3: /Range Format Date 1, indicate range C15..C16
Symph: MENU Format Date 1, indicate range C15..C16

3. Labels

Enter all the labels shown in figures 1 and 2. In *1-2-3* Release 2/2.01 or *Symphony*, do not enter anything in cell A24. To create lines, enter \–, _, or \=. Center the labels in range E20..F21: Select /Range Label Center (*Symph*: MENU Range Label-Alignment Center), and indicate range E20..F21. Right-align the labels in ranges B57..E57 and B62..E62.

4. Values

Enter the values shown in figures 1 and 2 in cells F22 and E23, and in ranges E29..E30, E33..E34, D42..D43, and D73..D74.

5. Range names

Name	Range
closedate	C15
purprice	F22
trtax	D70
tax	D76
days	C78

To assign the range names, press slash (*Symph*: MENU), select Range Name Create, enter the name, and indicate the range.

6. Formulas

Cell	Formula
C15	@DATE(89,4,1)
C16	@DATE(89,4,1)
A24	+“19”&@STRING(@YEAR(closedate),0)&“ Real Estate Taxes”

In *1-2-3* Release 1A, enter the label in cell A24 shown in figure 1.

Cell	Formula
B26	@DATE(@YEAR(closedate),1,1)
C26	+closedate
E26	@ROUND(tax*(C26–B26)/days,2)
E31	+trtax
E32	+trtax
E36	@SUM(E21..E35)
F36	@SUM(F21..F35)
F39	+F36–E36
D45	+D42–D43
D46	@SUM(E28..E35)
F48	+D45–D46
F50	+F39–F48
D69	@INT(purprice/500)+(@MOD(purprice,500)>0)
D70	+D69*0.25
D76	+D73+D74
C78	365+(@MOD(@YEAR(closedate),4)=0)

Save the worksheet.

WORKSHEET 2

Erase range A42..F50: Select /Range Erase (*Symph*: MENU Erase), and indicate range A42..F50.

1. Labels

Enter all labels shown in figure 3.

2. Values

Enter –70 in cell D44.

3. Formulas

Cell	Formula
D42	+E23
D43	–(purprice*0.075)
F44	@SUM(D42..D44)
F50	+F39+F44

Save the worksheet using a different name from that of the first worksheet.

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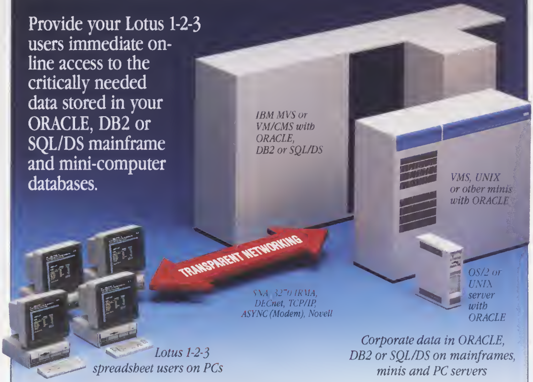
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	Montgomery			Feb 23
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AZ	Phoenix			Feb 7cfm
	Scottsdale			Mar 9a
	Tucson			Feb 14
CA	Costa Mesa		Feb 23av	Mar 23m
	La Jolla			Feb 9am
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	Shreveport			Feb 16r
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	Grand Rapids			Mar 8fm
	Lansing			Feb 14fp
	Troy			Mar 7fm
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	St Louis		Feb 9t	Mar 9fm
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	Greensboro			Feb 15r
	RTP			Mar 7r
NH	Bedford			Mar 14
NJ	Iselin		Feb 15fv	Mar 30fm
	Princeton		Feb 15t	Mar 15f
	Secaucus			Mar 2f
NM	Albuquerque			Mar 7f
NY	Amherst			Mar 28ap
	Fairport			Feb 9fv
	Melville		Feb 15v	Mar 15fv
	New York City		Feb 7av	Feb 22f
			Mar 8t	Mar 22f
OH	Akron			Feb 1f
	Beachwood			Mar 7r
	Cincinnati			Mar 23fv
	Columbus			Mar 9f
OK	Oklahoma City			Feb 8fm
	Tulsa			Mar 15t
OR	Portland			Mar 14fm
PA	Harrisburg			Feb 9
	King of Prussia			Mar 31r
	Philadelphia			Feb 6fv
	Pittsburgh			Mar 15fv
	Scranton			Feb 15p
RI	Providence			Feb 2f
SC	Charleston			Mar 9fr
	Columbia			Mar 23m
	Greenville			Feb 8f
TN	Knoxville			Feb 8r
	Memphis			Feb 16c
	Nashville			Mar 15r
TX	Austin			Mar 2r
	Dallas		Feb 1fv	Mar 7cf
	Houston		Feb 9fv	Mar 9afp
	San Antonio		Mar 3t	Mar 28g
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LOTUS MAGAZINE

ANALYZE LUMP-SUM INVESTMENTS

HERE ARE SOME SIMPLE TECHNIQUES FOR GAUGING THE GROWTH OF A ONE-TIME PAYMENT INTO AN INTEREST-BEARING ACCOUNT.

BY DONALD C. DIXON

To find out how much money you would accumulate in 10 years by faithfully depositing $100 every month into an account that pays 9% interest, just crank up your spreadsheet and enter the formula @FV(100,.09/12,10*12) to get the answer $19,351. But what happens when you make only one deposit of, say, $10,000 and leave it in an interest-bearing fund for 10 years? Your spreadsheet does not come with an @SPFV (single-payment future value) function.

Both businesses and individuals encounter opportunities to earn interest on a lump sum or to invest in ventures that promise to return a stated sum in the future. To make the best decisions about such opportunities, it's necessary to analyze them. A spreadsheet is an ideal tool for the analysis. Keep in mind, however, that most *1-2-3* and *Symphony* financial @functions are designed for series of payments. One exception is @CTERM, which tells you how long it takes a single payment to grow to a given future value. It's also useful to know the future values and present values of one-time payments. No @functions exist for computing these, but you can create simple formulas that do the job.

Of course, the @CTERM function and the formulas for computing future and present values depend on the rate of return on the investment. Your results will be more accurate if you convert the nominal, or stated, interest rate to an effective interest rate—the rate at which your investment actually grows given the effects of compounding the interest weekly, monthly, quarterly, or continuously.

If you don't care to memorize the mathematical operations for computing these values, incorporate them into a template that you can keep handy to evaluate your lump-sum investments. Such a template is shown in the worksheet screens. Take a few minutes now to build the template, using the instructions in the box on page 49. Then we'll examine the three sections of the worksheet.

USING THE TEMPLATE

This worksheet is actually three independent models, arranged so that you can easily view them by using the PageUp and PageDown keys. The first model computes the future value of one investment made today. The second tells you the present value of money you'll receive in the future. The third calculates how long it will take an amount you invest today to grow to a desired future value.

Each model contains separate sections for assumptions and calculations. You enter data pertaining to an investment you're evaluating in the Assumptions section. Note that cell B6 in figure 1 contains the word *continuous*. In some cases you'll enter this to indicate continuous compounding. In other cases you'll enter a number such as 4 to indicate quarterly compounding or 12 to indicate monthly compounding. Because the formula that depends on cell B6 checks to see whether B6 contains a value (rather than evaluates its exact contents), you can abbreviate *continuous* any way you choose. When you enter the word *continuous* in a *Compounding Periods per Year* cell, you must then enter a value, usually 360 or 365, in the *Days in Year* cell. If you enter a number for compounding periods, you may leave the *Days in Year* cell empty.

Each of the worksheet's Calculations sections contains a formula that converts the stated interest rate to the effective rate. We'll look more closely at those formulas later. Additional formulas in the Calcula-

SANDRA HENDLER

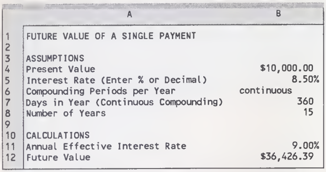
tions sections use the effective rates to compute the future value, present value, or term of the investment.

The first model, shown in figure 1, lets you determine the future value of a single payment. Suppose you have $10,000 that you'd like to salt away for 15 years in order to finance a future expenditure. You learn that your bank offers an account that pays 8.5% interest. To use the model, you must know the compounding method the bank uses. You find that it compounds the interest continuously and assumes a 360-day year in its calculations.

The values entered in range B4..B8 reflect the scenario just described. The formula in cell B11 converts the nominal interest rate in cell B5 to the effective interest rate. Cell B12 returns the future value by multiplying the investment by 1 plus the effective rate raised to the power of the number of years. The model uses this formula instead of an @FV formula because @FV assumes a steady flow of equal payments throughout the life of the investment. Given the terms you entered in the assumptions section, your $10,000 will be worth $36,426.39 in 15 years.

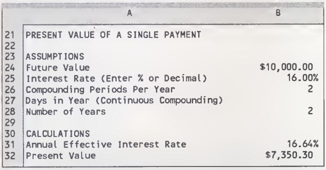
YOU MUST ASK, "HOW MUCH IS $10,000 IN THE FUTURE WORTH TO ME TODAY?"

You can use this model to play what-if and decide where it is most advantageous to put your money. Suppose there are two other banks nearby, one offering 8.6% interest compounded monthly and the other offering 8.7% interest compounded quarterly. Change the entries in cells B5 and B6 to .086 and 12, respectively. The value in cell B12 changes to $36,161.12. Now, change the entries in cells B5 and B6 to .087 and 4, respectively. The value in cell B12 changes to $36,364.60. Even though these two banks offer higher nominal rates, your bank gives you a better return on your investment because it compounds interest continuously.



	A	B
1	FUTURE VALUE OF A SINGLE PAYMENT	
2		
3	ASSUMPTIONS	
4	Present Value	$10,000.00
5	Interest Rate (Enter % or Decimal)	8.50%
6	Compounding Periods per Year	continuous
7	Days in Year (Continuous Compounding)	360
8	Number of Years	15
9		
10	CALCULATIONS	
11	Annual Effective Interest Rate	9.00%
12	Future Value	$36,426.39

FIGURE 1. This section of the worksheet calculates the future value of a sum invested now. You enter values pertaining to an investment in range B4..B8. The formula in cell B11 converts the stated interest rate in cell B5 to an effective interest rate, which takes into account the frequency of compounding. Cell B12 determines the future value of the amount in cell B4, given the effective interest rate and the number-of-years value in cell B8.



	A	B
21	PRESENT VALUE OF A SINGLE PAYMENT	
22		
23	ASSUMPTIONS	
24	Future Value	$10,000.00
25	Interest Rate (Enter % or Decimal)	16.00%
26	Compounding Periods Per Year	2
27	Days in Year (Continuous Compounding)	
28	Number of Years	2
29		
30	CALCULATIONS	
31	Annual Effective Interest Rate	16.64%
32	Present Value	$7,350.30

FIGURE 2. This section is similar to figure 1, except that it determines the present value of an amount you'll receive in the future. When you enter values pertaining to an investment in range B24..B28, the formulas in cells B31 and B32 convert the interest rate and calculate the present value.

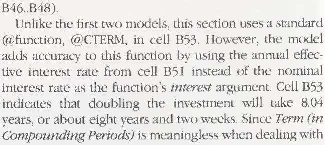
Press the PageDown key and the second model, shown in figure 2, appears on your screen. This model lets you determine the present value of a sum of money that you'll receive in the future. Suppose you have an opportunity to invest in a startup company that plans to market microprocessor-controlled yo-yos. The company's founder promised that if you make a $5,000 investment now, you will receive a check for $10,000 in two years.

At first this seems like a good deal, but you must ask, "How much is $10,000 received in the future worth to me today?" The answer depends in part on what kind of return you could get if you had the $10,000 to invest now. You learn that you can buy a junk bond that pays 16% interest, compounded semiannually. The bond is risky, but so is the yo-yo investment. In order to determine the present value of the promised $10,000, we've entered the values shown in range B24..B28 of figure 2. The formula in cell B32 divides the future value by 1 plus the effective interest raised to the power of the number of years of the investment. The formula differs from an @PV formula, which is based on a series of equal payments at regular intervals. This section tells you that at 16% interest compounded semiannually, $10,000 received two years from now has a present value of $7,350.30. If you feel confident that electronic yo-yos will be the next craze, investing $5,000 in this operation is a good deal, since $5,000 is less than the present value of $10,000, even at a high interest rate.

You can also use the present-value section to calculate the single deposit you must make to accumulate a future value, such as the sum needed to repay a loan. Enter the values .0775 and 10 in cells B25 and B28, respectively. The screen now shows that in order to have $10,000 in 10 years, if your bank pays 7.75% interest compounded semiannually, you must deposit $4,674.97 today.

Pressing PageDown again reveals the third model. With this model you can answer the question: How many years are required to accumulate a specified sum by making a single deposit at a given interest rate? You can use this model to determine how long it takes to double an investment, as we've done in figure 3. Specifically, we want to know how long it takes $10,000 (cell B45) to become $20,000 (cell B44) if the deposit accrues interest at 8.5% compounded continuously, using a 360-day year (range B46..B48).

Unlike the first two models, this section uses a standard @function, @CTERM, in cell B53. However, the model adds accuracy to this function by using the annual effective interest rate from cell B51 instead of the nominal interest rate as the function's *interest* argument. Cell B53 indicates that doubling the investment will take 8.04 years, or about eight years and two weeks. Since *Term (in Compounding Periods)* is meaningless when dealing with continuous compounding, the formula in cell B52 returns NA when you enter *continuous* in cell B47. (The *1-2-3* and *Symphony* manuals both define the abbreviation NA as "not available," but in this worksheet, it means "not applicable.") Now assume that the account you're evaluating is compounded monthly instead of continuously. Enter 12 in cell B47. The *Term (in Years)* value (cell B53) changes to 8.18. The formula in cell B52 multiplies the value in cell B53 by the number of compounding periods per year, returning 98.20. This means that it will take



	A	B
41	NUMBER OF YEARS NEEDED TO REACH GOAL	
42		
43	ASSUMPTIONS	
44	Future Value (Target Amount)	$20,000.00
45	Present Value (Amount Invested)	$10,000.00
46	Interest Rate (Enter % or Decimal)	8.50%
47	Compounding periods per year	continuous
48	Days in Year (Continuous Compounding)	360
49		
50	CALCULATIONS	
51	Annual Effective Interest Rate	9.00%
52	Term (in Compounding Periods)	NA
53	Term (in Years)	8.04

FIGURE 3. This section tells you how long it will take the present value of an investment amount (cell B45) to reach a future value (cell B44), with the investment accruing interest at a given rate (cell B46). The formula in cell B52 converts the term expressed in years to a term expressed in compounding periods when there is a value in cell B47. Here, the formula returns NA (meaning "not applicable" in this spreadsheet) because *compounding period* is meaningless in a continuous-compounding setting.

about 98 months to double the $10,000.

As you can see, determining future values, present values, and terms is reasonably simple, despite the lack of @functions for the first two values. The most complex element in the template is producing interest rates that show the effect of different compounding scenarios. The formulas that do this require some explanation.

COMPUTING EFFECTIVE INTEREST RATES

The method for converting a nominal, or stated, interest rate to an annual effective rate (AER) was discussed in detail in the article "When 10% Isn't 10%" in the November issue. Briefly, one of two formulas is required. For noncontinuous compounding, you derive AER by adding 1 to the quotient of the nominal interest rate (*int*) divided by the number of compounding periods (*cp*), raising that sum to the power of the number of compounding periods, and then subtracting 1:

$$\mathrm{AER} = (1 + int/cp)^{cp} - 1$$

For continuous compounding, determining the AER involves the value 2.718282, known in mathematics as the natural number *e*. You determine AER by dividing the nominal interest by the days-per-year (*dpy*) number that the bank uses, multiplying that quotient by 365, raising *e* to the power of that product, and subtracting 1:

$$\mathrm{AER} = e^{int/dpy \times 365} - 1$$

To calculate this with *1-2-3* or *Symphony*, use the @EXP function with the superscripted portion of the last equation inside the parentheses: @EXP(*int*/*dpy**365) − 1.

We incorporate these two procedures into the spreadsheet with the formulas in cells B11, B31, and B51. These use the @IF function to apply one or the other of the formulas we just examined, depending on what you enter in the *Compounding Periods per Year* cells in their respective sections. If, for example, you enter a value in cell B6, cell B11 returns the result of the expression (1 + B5/B6)^B6 − 1. If you leave cell B6 blank or enter a label, cell B11 returns the result of the expression @EXP(B5/B7*365) − 1. ■

Donald C. Dixon wrote about converting interest rates for use with financial @functions in the November issue.

HOW TO SET UP THE WORKSHEET

1. Default settings

Format: Currency, 2
1-2-3: /Worksheet Global Format Currency, press Return
Symph: MENU Settings Format Currency, press Return, Quit

2. Individual column widths

A	40
B	15

For example, to set the width of column A, place the cell pointer in column A and select

1-2-3: /Worksheet Column Set-Width, enter 40
Symph: MENU Width Set, enter 40

3. Cell formats

Format	**Range**
Percent 2 (*Symph*: % 2)	B5
General	B6..B8
Percent 2 (*Symph*: % 2)	B11
Percent 2 (*Symph*: % 2)	B25
General	B26..B28
Percent 2 (*Symph*: % 2)	B31
Percent 2 (*Symph*: % 2)	B46
General	B47..B48
Percent 2 (*Symph*: % 2)	B51
Fixed 2	B52..B53

For example, to set the format for cell B5, select

1-2-3: /Range Format Percent, press Return, indicate cell B5
Symph: MENU Format %, press Return, indicate cell B5

4. Labels

Enter all the labels shown in figure 1 except for the one in cell A4. Copy the following ranges:

From	**To**
A3..A11	A23
A3	A43
A5..B7	A46
A10..A11	A50

Then enter the label shown in cell A4. Enter labels shown in figure 2 in cells A21, A24, and A32.

Enter labels shown in figure 3 in cells A41, A44, A45, A52, and A53.

5. Values

Enter the values shown in the figures in the following ranges and cells: B4..B5, B7..B8, B24..B26, B28, B44..B46, and B48.

6. Enter and copy formulas

Cell	**Formula**
B11	@IF(@CELL("type",B6..B6) = "v", (1 + B5/B6)^B6 − 1, @EXP(B5/B7*365) − 1)

Copy cell B11 to cell B31.

Cell	**Formula**
B12	+ B4*(1 + B11)^B8
B32	+ B24/(1 + B31)^B28
B51	@IF(@CELL("type",B47..B47) = "v", (1 + B46/B47)^B47 − 1, @EXP(B46/B48*365) − 1)
B52	@IF(@CELL("type",B47..B47) = "v", B53*B47,@NA)
B53	@CTERM(B51,B44,B45)

Alternative formulas for *1-2-3* Release 1A:

Cell	**Formula**
B11	@IF(B6,(1 + B5/B6)^B6 − 1, @EXP(B5/B7*365) − 1)
B51	@IF(B47,(1 + B46/B47)^B47 − 1, @EXP(B46/B48*365) − 1)
B52	@IF(B47,B53*B47,@NA)

Alternative formula for *1-2-3* Release 1A and *Symphony* Release 1/1.01:

Cell	**Formula**
B53	@LN(B44/B45)/@LN(1 + B51)

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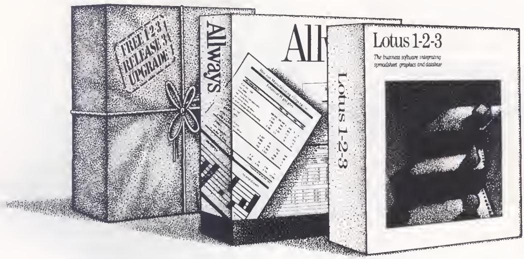

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CIRCLE 123 ON READER SERVICE CARD

Printing Worksheets

SPECIAL REPORT

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A
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CHRIS McALLISTER

You've crunched the numbers, run the analysis, and seen the results. Now it's time to share your work with the rest of the world. That means printing—and that's where the problems begin.

This special report focuses on the challenges of producing high-quality hard copy. The report will help you in a variety of ways, from selecting the right printer and the right utility software to mastering the *1-2-3* and *Symphony* techniques necessary to produce report-quality worksheets. So before you hit Align Go again, scan this report. Then print your worksheets with confidence.

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63 Setup Strings Can Control Printing
66 Update: Lotus Printer Drivers
68 How to Print Worksheets on the LaserJet
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73 Some Essential Printer Utilities
75 Design Spreadsheet Reports with *Allways*

WHAT KIND OF PRINTER SHOULD YOU BUY?

Questions to answer before you write the check

BY RICK COOK

The good news is that printers and plotters are becoming more capable and less expensive. The bad news is that, as a result, it's much harder to decide which printer to buy. Today there's a wider range of printers to choose from than at any time in the short history of personal computing.

The key factor in buying a printer or a plotter is knowing what you really need. If you don't know, you can easily spend a lot of money for a printer that turns out to be totally unsatisfactory. Before you even look at printers, consider the following questions:

How many pages will you need to print each day or week? The key measure for this question is average weekly use. That is, you may run the printer constantly for one day but infrequently during the rest of the week. An occasional burst of heavy work won't hurt a printer, but consistently pushing one beyond its performance rating can lead to expensive repairs.

Printers are optimized for the amount of printing they are expected to do. Some 9-pin dot-matrix printers, for example, are worth their almost-$1,500 price. Their print quality isn't any better than that of their $250 cousins, but they are designed for heavy-duty use and can print hundreds of pages a day.

What print quality do you need? If you require top-quality, professional-looking, black-and-white output, you need a laser printer. One rung down the quality scale is so-called letter-quality, which can be produced by thermal or ink-jet printers. Dot-matrix printers produce output slightly less crisp and clean than the output of thermal and ink-jet printers. If you simply need to print typewriter-quality business letters without graphics, a daisy-wheel printer might be right for you.

Do you need a wide-carriage printer? If most of your work involves spreadsheets or financial statements, you probably need a wide-carriage printer. Except for laser printers and a few special cases such as the Apple Imagewriter for the Macintosh, a wide-carriage model will be only $100 to $200 more expensive than a standard-width model.

The exceptions are notable, however. A wide-page laser printer, for example, can cost twice as much as a conventional laser printer. And your choices are limited, since only a few companies, such as Tektronix, make such a printer.

Do you need to combine text and graphics? If you need to print text and graphs on the same page, you'll need a letter-quality dot printer (dot-matrix, thermal, or ink-jet) or a laser printer.

How much speed do you need? Printers print at different speeds. Dot printers print text at speeds of 40 characters per second (cps) to over 400 cps. On average, it takes 55 seconds for a 40-cps dot-matrix printer to print a page of text. Laser printers average about two pages per minute, depending on the mix of fonts, text, and graphics. Most daisy-wheel printers chug along at about 30 to 60 cps—a slow model takes a little more than 3½ minutes to print one page.

Within each printer category, a faster printer generally costs more. A 40-cps dot-matrix printer might sell for less than $200, while a 300-cps dot-matrix printer will cost $1,000 or more.

Printer-speed ratings can be misleading. For example, a laser printer rating of, say, eight pages per minute (ppm) means that at best, the printer can print eight pages of text per minute. The actual speed can slow to less than a page per minute if the page is full of complex graphics.

Plotters are in a class by themselves. A plotter's speed is rated in inches of pen travel per second, but the time it takes a plotter to produce a page depends entirely on how complex the drawing is. Some engineering drawings can take hours to complete.

Do you need color? If the answer is yes, be prepared to pay a good deal more for your printer. At the moment, there are no reasonably priced color laser printers, although a few models that start at $25,000 are expected later this year. Some dot printers can handle color. Plotters use different color pens to print colors; the more pens a plotter has and the faster it plots, the more it costs.

Do you work with multipart forms? If so, your printer choice is limited to a

CHRIS McALLISTER

dot-matrix or a daisy-wheel printer. Laser, thermal, and ink-jet printers can't handle that job.

What type of paper feed do you need? If you buy a laser printer, you have practically no choice. You can feed it single sheets or use a paper tray similar to that on a copying machine. The simplest and cheapest type of paper-feed mechanism for most other printers is friction. The printer's platen grips the paper and feeds it through as a typewriter platen does. Friction feed is suited only for very light use and generally only for feeding single sheets. You can use fanfold paper, but you have to watch it constantly to keep the paper from skewing and jamming in the printer.

With some printers everything except friction feed is an extra-cost option. A few printers, notably some of the old-style thermal printers and some plotters, use rolls of paper. This is best suited to an application where the printer must produce a continuous record, as in data logging. Roll feed generally isn't suited to business applications.

By far the most popular way to feed paper to a printer is to use a tractor-feed mechanism. Sprockets on wheels engage holes in the perforated strips on either side of the fanfold paper and pull it through the printer mechanism. Tractors are rugged and reliable.

On some printers the tractor is arranged so that you don't waste a sheet of paper every time you detach a printout. Other printers have two tractors so that you can load two kinds of fanfold paper at the same time. Still others, notably IBM's Proprinter, provide a slot through which you can feed a single sheet of paper without removing the tractor.

Tractorless, or sheet, feeders are also popular, especially for word processing. The sheet feeder feeds individual pieces of paper to the printer from bins. Many sheet feeders have two or three bins for different types or sizes of paper. The printer can take a letterhead from one bin, plain paper for the succeeding pages from another bin, and envelopes from a third bin.

Sheet feeders are expensive and are prone to jam. A sheet feeder for a top-quality daisy-wheel or dot-matrix printer can cost $500 or more.

What will the printer really cost? In addition to the printer's purchase price, you may have to buy the cable that connects the printer to your computer's parallel or serial port. Off-the-shelf cables usually cost $20 to $50, but prices can escalate to $75 or more if the printer's installation requires a specially constructed cable.

As with any piece of equipment, the real cost of a printer includes not only its price but also its long-term operation and maintenance costs. The expense of printer supplies—paper, ribbons, and toner—adds up quickly. For example, a printer ribbon can cost less than $5 or more than $20, depending on the type. A ribbon for a sophisticated thermal color printer sells for $90, and you have to replace it about every 300 pages. A replacement laser-printer cartridge, which includes toner, costs $130 and is good for 4,000 pages.

What about my future needs? The old saw that says you should buy a more powerful computer than you think you need also applies to printers. For example, today you may not care much about how your worksheets look, but as new presentation software, such as Funk Software's *Allways* spreadsheet-enhancement program, becomes more widespread, you will want a printer that can take full advantage of the software.

What follows are brief descriptions of the various types of printers. Each has strengths and weaknesses. If you do your homework, you're sure to find one that closely fits your needs and budget.

Accompanying the descriptions of printers is a representative sample of popular models in each of five categories. Our selections are based on information from the market research firms International Data Corp. and InfoCorp.

Many of these printers, because they are relatively new or for other reasons, are not listed on the chart of printers for which *1-2-3* and *Symphony* printer drivers exist (page 66). However, an unlisted printer may emulate another printer for which a driver exists, or the printer manufacturer may supply a driver. Before you buy a printer, test the printer you want with the software you plan to use.

Dot-Matrix Printers

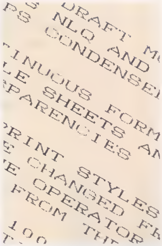
Dot-matrix printers are the workhorses of modern computing. In 1988 almost five million dot-matrix printers were sold in the United States, according to market research firm CAP International (Norwell, Mass.). Put another way, last year American businesses

DOT-MATRIX PRINTERS

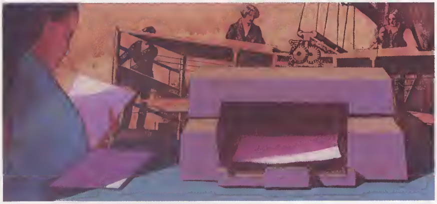
Manufacturer	Model	Speed (cps)[1] Draft	 NLQ[2]	Price
9-Pin Printers				
Apple	ImageWriter II	250	45	$ 595
Citizen	MSP-40	240	48	$ 449
Epson	FX-1050	264	54	$ 799
Epson	LX-800	150	25	$ 299
IBM	Proprinter III	200	54	$ 649
Okidata	Microline 320	300	63	$ 499
Panasonic	1091i	192	38	$ 300
Star Micronics	NX-1000	144	36	$ 299
24-Pin Printers				
Brother	M-1724L	216	72	$ 949
NEC	Pinwriter P2200	170	55	$ 569
NEC	Pinwriter P5200	138	50	$ 799
Toshiba	P321SLC	216	72	$ 949
Toshiba	P351SX	186	105	$1,599

[1] characters per second

[2] near-letter-quality



Each dot from this 9-pin Diconix 150 dot-matrix printer measures about 14-thousandths of an inch.



bought four dot-matrix printers for every laser printer.

There are some excellent reasons for their popularity: Dot-matrix printers are inexpensive and reliable, produce reasonable-quality output, and can print graphics, as well as text. They can use any kind of paper, and they are one of the few types of printers that can handle multipart forms. In addition, the print quality of dot-matrix printers has improved greatly in the last few years.

A dot-matrix printer builds each character out of dots. The printhead contains one or more vertical rows of wires, or pins, and each pin, when pressed against the ribbon, produces a dot on the page. With the early dot-matrix printers, each dot was clearly visible, which resulted in the grainy, grayish print that gave dot-matrix printers a bad name. Today's dot-matrix printers still produce this grainy print when used in draft, or high-speed, mode. But most of them offer a letter-quality mode, in which the dots overlap to produce much sharper print.

Because of the different modes, dot-matrix printers have either two or three speeds. If you see speed listed as 100/45 cps, for example, 100 is the printer's draft-quality speed, and 45 is the letter-quality speed.

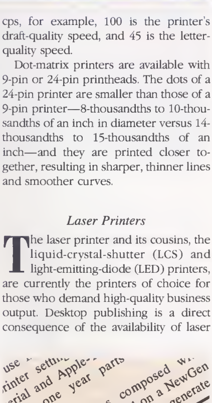
Dot-matrix printers are available with 9-pin or 24-pin printheads. The dots of a 24-pin printer are smaller than those of a 9-pin printer—8-thousandths to 10-thousandths of an inch in diameter versus 14-thousandths to 15-thousandths of an inch—and they are printed closer together, resulting in sharper, thinner lines and smoother curves.

Laser Printers

The laser printer and its cousins, the liquid-crystal-shutter (LCS) and light-emitting-diode (LED) printers, are currently the printers of choice for those who demand high-quality business output. Desktop publishing is a direct consequence of the availability of laser printers priced less than $10,000.

LASER PRINTERS					
Manufacturer	Model	Rated Speed (ppm)[1]	Standard Memory	Price	Post-Script
Apple	LaserWriter II NTX	8	2MB	$6,999	Yes
DEC	LN03	8	96K	$2,953	No
Hewlett-Packard	LaserJet Series II	8	512K	$2,695	No
Kyocera	F-1000A	10	512K	$2,895	No
NEC	Silentwriter LC 890	8	3MB	$4,795	Yes
QMS	KissPlus Model 10	8	512K	$2,690	No

[1] pages per minute



use ... setting ... rinter and Apple- ... parts serial and a one year ... and a ... ranty. ... page was composed w... nd printed on a NewGen r. The chart was generate

NewGen's TurboPS/300 PostScript-capable laser printer comes with 2 megabytes of memory.

Like a photocopy machine, a laser printer transfers a dry ink, called toner, to image areas on a drum that has been electrostatically charged. The difference is that instead of reflecting the image from an existing document, a laser printer writes the image from the computer onto the drum. The toner is deposited on the drum according to the electrostatic charge and then transferred to the paper. Finally, rollers, usually heated, bond the toner to the paper.

The difference among laser, LCS, and LED printers is the light source used to expose the drum: A laser printer uses a laser beam; an LCS printer uses a strong light source and liquid-crystal shutters; and an LED printer uses a row of powerful light-emitting diodes. The exact mechanism doesn't matter very much. Basically, laser, LCS, and LED printers fall into the same price range and have the same characteristics. For this reason, we will use "laser printers" to refer to all three types. LCS printers, such as those from Taxan USA Corp., Qume Corp., and Fortis Information Systems, however, tend to be smaller than laser printers.

Laser printers are flexible, powerful, and expensive. The least costly ones list for around $1,200, and prices climb to $10,000 and more for higher print speeds and special features. In addition, a laser printer takes more setting up than other kinds of printers. To get the most out of a laser printer, you need a computer with a hard disk and a lot of memory.

Almost all laser printers contain their own built-in microprocessor and memory. Which microprocessor your laser printer uses (most commonly it's a Motorola M68000) is less important than the amount of memory it has. Most laser printers have to construct an image of the entire page in memory before they can deposit the toner and print the page. If a laser printer doesn't have enough memory, it can't print the page.

To assemble a full page of mixed text and graphics at a resolution of 300 dots per inch (dpi), a printer could require 1 megabyte of memory. Many lower-priced laser printers contain 512K or less. That's fine for a page of text in a single typeface,

CHRIS McALLISTER

such as a business letter. If you add a letterhead and charts, however, you will run out of memory, and the printer will produce just part of the image. When this happens, the quick-and-dirty solution, if possible, is to lower the resolution, or print quality, to 150 dpi or even 75 dpi from the standard 300 dpi, and this still may not free up enough memory. For quality, you must add memory, if the printer allows for it. Bringing a printer's memory up to a full megabyte can cost $1,000 or more.

If you plan to print graphics, you should also decide how closely you want the printed version to match what's on your screen. For high-quality graphics output, you need a PostScript-capable laser printer. In short, PostScript is a detailed page-description language that allows your software to supply your printer with information on the shape and placement of characters and graphics. A PostScript printer has more prepackaged fonts than a non-PostScript printer and can take over some of the PC's processing chores.

The quality is higher and so is the price. You can buy a non-PostScript laser printer that can print full-page graphics for about $2,000. By contrast, the least expensive PostScript laser printers list for around $3,000 and easily climb to the $5,000-to-$8,000 range. PostScript capability may also mean a longer learning curve. You will need software that can take full advantage of the complex page-description language, and such software is difficult to master and exacting to use.

Laser printers also vary in print speed. Most of the less expensive models are rated at 4 to 6 pages per minute (ppm). Faster, more expensive models are rated at 10 to 15 ppm, and you can find laser printers rated from 20 to 60 ppm for less than $20,000. The fastest laser printers are rated at 100 ppm or more, but these cost hundreds of thousands of dollars.

Rated speed is misleading, however, because manufacturers base their ratings on a printer's ability to print a page of text rather than a page that contains text and graphics. When printing text and graphics, most laser printers operate at about half their rated speed.

INK-JET PRINTERS

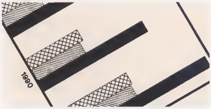
		Speed (cps)[1]		
Manufacturer	**Model**	**Draft**	**NLQ[2]**	**Price**
Canon USA	BJ-130	220	52	$1,095
Dataproducts	SI-480	287 (LQ)[3]	200 (EQ)[4]	$2,795
Diconix	300	310	73	$ 599
Hewlett-Packard	DeskJet	240	120	$ 995

[1] characters per second

[2] near-letter-quality

[3] letter-quality

[4] executive-quality, which company claims is near-typeset quality



Unlike most ink-jet printers, Hewlett-Packard's DeskJet doesn't require special paper.

Ink-Jet Printers

An ink-jet printer is generally quieter than a dot-matrix printer and uses less power. It produces dots by squirting tiny drops of ink onto the paper, so there's no ribbon to wear out and cause print quality to fade. The print is dark and sharp right up to the moment the ink cartridge runs dry.

Ink-cartridge technology has two main drawbacks. The first is that the ink channels in the printhead tend to clog, especially in low humidity. However, most ink-jet printers provide a way for you to clear clogs, and some printers clean the channels automatically before or after each use. The second drawback is that most ink-jet printers need special paper that prevents the ink from "wicking," that is, soaking into the paper and bleeding.

However, Hewlett-Packard's DeskJet and several models from other makers don't require special paper. With a list price of slightly less than $1,000, HP's DeskJet is essentially a poor man's laser printer. The DeskJet prints at 300 dpi and produces text and graphics of a quality nearly equal to that of a laser printer.

The DeskJet has limitations. It cannot print as many fonts and point sizes as a PostScript-capable laser printer. And the DeskJet's recommended daily capacity is only 50 pages, compared with about 150 pages a day for a laser printer. But thanks to its almost-$1,500 price advantage, the DeskJet has pumped new life into ink-jet printer sales.

THERMAL PRINTERS

Manufacturer	**Model**	**Color**	**Speed**	**Price**	**Post-Script**
IBM	Quietwriter Model 2	No	48 cps[1] (LQ)[2]	$ 999	NA
Okidata	Okimate 20	Yes	80 cps draft/ 40 cps NLQ[3]	$ 268	NA
QMS	Colorscript 100 Model 30	Yes	1 ppm	$21,995	Yes
Tektronics	Phaser Color Printer	Yes	1 ppm	$12,995	Yes

[1] characters per second

[2] letter-quality; only text mode on this printer

[3] near-letter-quality

Thermal Printers

New technology has also transformed thermal printers. The printhead contains electrically heated elements, or resistors, and the newer thermal printers use a ribbon that is impregnated with a special waxlike ink, which is melted onto the paper.

A thermal printer is usually smaller, lighter, and quieter than a dot-matrix printer, but not as quick. The black-and-white print quality of a thermal printer is similar to that of an ink-jet or dot-matrix printer in letter-quality mode. Color is where thermal printers really come into their own. The waxlike inks they use give colors outstanding clarity and brilliance.

Output from Tektronix's Phaser CP printer shows the brilliant color produced by a thermal printer's waxlike inks.

That's why, among the various types of printers, a thermal printer does the best job of creating colorful overhead foils.

Daisy-Wheel Printers

Until the advent of the laser printer, daisy-wheel printers set the standard for print quality, and they still provide high-quality text printing. That's because the daisy-wheel printer's characters are formed smoothly by lines, not built up out of dots like characters formed by a dot-matrix printer.

The daisy-wheel printer gets its name from the removable print element, which consists of character-bearing stalks that radiate from a hub like the petals of a flower. A daisy-wheel printer is similar to an electronic typewriter. Under the computer's control, the daisy wheel rotates to line up the proper character and then strikes it against the ribbon.

On the con side, a daisy-wheel printer cannot print graphics. It can produce only the characters on the wheel. If you want another typeface or size, you have to change the daisy wheel. In addition, a daisy-wheel printer is noisier, slower, and more expensive than a dot-matrix printer.

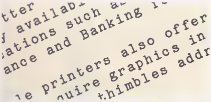
Because of these drawbacks, the letter-quality role played by the daisy-wheel printer is now passing to the laser printer. And the improving quality of dot-matrix printers is squeezing daisy-wheel printers out of the low end of the market.

DAISY-WHEEL PRINTERS

Manufacturer	Model	LQ[1]Speed[2]	Price
Brother	HR-40	40	$ 899
NEC	Spinwriter 3500	33	$1,297
Qume	Sprint 1140 Plus	40	$1,195

[1] letter-quality

[2] characters per second



tter
availab
ations such
ance and Banking
e printers also offer
uire graphics in
thimbles addr

NEC Information Systems' Spinwriter 8800 thimble printer produces output similar to that of a daisy-wheel printer.

Printing in Color

Most types of printers are available in models that print in color, but these are much pricier than black-and-white models. Dot-matrix printers can often use a two-color or four-color ribbon to produce color for charts and reports. This is an inexpensive way to get color, but the ink may smear if you try to mix colors from the ribbon. Ink-jet printers do a better job, although the resolution still isn't very high.

To produce the full spectrum of colors, printers use either three or four colors. A three-color printer creates all its colors from a set consisting of cyan, magenta, and yellow. A four-color printer adds black to the three basic colors.

A separate black is useful in applications with a lot of graphics because the black produced by mixing the three primary colors is grayish or brownish, depending on the printer. For ink-jet printers, a separate black is especially important because it takes so much ink to make a composite black that the ink tends to soak into the paper and smear.

Thermal printers probably do the best job of color printing for a reasonable price. Color thermal printers suitable for business use generally start at about $3,850. If your budget is tiny, Okidata's Okimate 20 color thermal printer costs $268, about the same price as an inexpensive dot-matrix printer. However, it takes about 20 minutes to produce one color page, and a ribbon lasts for only a few full-color pages, although a replacement color ribbon costs only about $5.

At the other end of the spectrum are color thermal page printers, such as the Tektronix Phaser and the QMS ColorScript. Like laser printers, these printers build the image of a full page of text and graphics at one time and produce a resolution of 300 dpi. However, at $12,000 to $25,000, these printers are not cheap. Moreover, they need special paper, and their ribbons, good for about 300 pages, cost about $100 each.

Due to price and other factors, thermal page printers are special-purpose devices. Their resolution isn't high enough to produce color separations (the separate negatives needed for professional color printing), but they can produce composite mock-ups of advertisements, packages, or anything else to be professionally printed. This makes them attractive to advertising agencies, designers, and others who need to see what something will look like before it goes to print. In fact, QMS announced that its printers can now produce colors keyed to the Pantone color scale that print shops use to mix and select inks.

Color thermal page printers also shine in presentations. Thermal printers can produce overhead foils in full, vivid color. They can print shadings and filled areas that even a plotter cannot match.

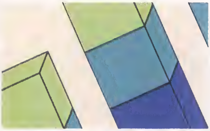
What About Plotters?

Plotters are designed primarily to produce graphs and engineering drawings. Unlike a printer, a plotter literally draws a picture, using colored pens carried by a mechanical arm. Because the resulting lines can be continuous, plotters generally produce higher-quality color graphics than most printers. Not even a 300-dpi laser printer can match the print quality of a lower-priced plotter, and laser printers that print in color are prohibitively expensive.

Although plotters can produce acceptable labels and legends on a graph or drawing, they are wholly unsuited for pages of text. Today, plotters are especially popular for preparing overhead foils. A projector can clearly project the lines drawn by a plotter, and plotter inks tend to be bright and vivid on the screen.

Three common methods of rating plotters are by the number of pens, the pen speed, and the size of paper the plotter can handle. A plotter may have from one to a dozen pens and will automatically change among them as needed. Unlike ink-jet or thermal printers, a plotter can't mix colors to produce new colors; it needs a separate pen for each color.

Pen speed is measured in inches per second. Because of the way they work, plotters are inherently slow. It takes a plotter several minutes to produce even a simple bar chart, and a complex illustration can take hours. Generally, the



While unsuited for pages of text, most plotters, such as the Hewlett-Packard 7550A, shine at high-quality color graphics.

higher the pen speed, the more expensive the plotter. Plotters start at around $250 and climb rapidly in price. Most of the medium-duty desktop units suitable for business graphics cost between $1,000 and $2,000.

Getting a plotter to work with your software can be tricky. As with printers, you must have the correct plotter driver. Like PostScript-capable laser printers, plotters use a special command language to communicate with computers. The most common languages are Hewlett-Packard's HP-GL and Houston Instrument's D/MPL.

The Setup Blues

Printers differ widely in ease of setup, but generally, the more capable the printer, the harder it is to set up everything properly. This is an argument against getting more printer than you really need. You pay for the extra features and complexity, not just in dollars but in time and effort as well.

Setting up a printer consists mainly of configuring the printer and installing the correct printer drivers. A printer driver is a small program that allows your application to communicate with and control the printer. Because each company's printers use different commands, you usually need different drivers to translate each program's commands into printer commands. Popular software often comes with drivers for 50 or more printers, but not all drivers support all of a printer's features. In general, if a program comes with a driver for a specific make and model of printer, you can be pretty sure it will handle everything the printer can do.

However, no software company can provide a driver for every printer on the market. As a result, printer manufacturers often design a printer so that it can emulate another printer for which drivers already exist. The most common emulations are for the Epson MX and FX series of dot-matrix printers, the IBM dot-matrix Proprinter, and the Diablo 630 daisy-wheel printer. In addition, most laser printers will emulate the Hewlett-Packard LaserJet or LaserJet Series II printer.

Almost all emulations will handle simple text documents, but some emulations have trouble with complex printing, notably graphics and proportionally spaced fonts. Printed graphics may be distorted if your printer has a different aspect ratio (proportion of width to height of the printed image) than the printer it's emulating. If the aspect ratios don't match, there's nothing you can do but resign yourself to elliptical pie charts and slightly squashed figures.

In proportionally spaced text, the computer controls the space between the letters to produce text that looks typeset. The problem is that different printers tend to have letters of different widths. For example, the letter M on an Epson printer may be wider or narrower than the M on a Panasonic printer with Epson emulation. Since proportional spacing relies on character-width tables built into the software, you may have to live with odd-looking or unjustified lines of text.

The best plan is to try out the printer you want with the software you intend to use. If your software doesn't come with a driver for the printer you want, or if the printer you want emulates another printer, you must make sure you can live with any limitations. The more of your printer's features you intend to use, the more careful you need to be. ■

Rick Cook, a free-lance writer based in Phoenix, specializes in high technology.

PRINTER TRENDS

This year printers are going to get better, if not necessarily cheaper, according to John Boldt, an industry analyst for Dataquest, a market research firm in San Jose, Calif.

We're going to see several more 300-dot-per-inch ink-jet printers like Hewlett-Packard's DeskJet. HP hit paydirt with the DeskJet, and Boldt expects other companies to follow suit. During the next four years, Dataquest expects sales of ink-jet printers to grow from the 402,400 units sold in 1988 to more than 1 million units in 1992.

During that same period, Dataquest predicts, laser printer sales will climb from 1988's 1 million units to more than 2 million per year. Fueling this growth will be steadily, albeit not dramatically, falling laser printer prices, says Boldt. "We're not going to see a $1,000 true laser page printer in the next 12 months," he says, "but we could see list prices down to $1,500." However, he adds that printers at those prices most likely will be character-only printers without sufficient memory to print serious graphics.

Dot-matrix printer prices are not expected to fall much. Instead of cutting prices, manufacturers will add more features and hold current price levels. The expected features include support for a wider range of type fonts and improved paper handling. This means, for example, the ability to print single sheets or envelopes without unloading the tractor. Also expect to see more 24-pin dot-matrix printers at 9-pin prices. "We already have 24-pin printers selling for less than $500," says Boldt.

In addition to working better, all types of printers will be easier to set up under OS/2. A future release of Presentation Manager, OS/2's graphical user interface, will have a built-in, generic printer driver. "As long as a printer is compatible with Presentation Manager, you'll be supported," Boldt says.

—R. C.

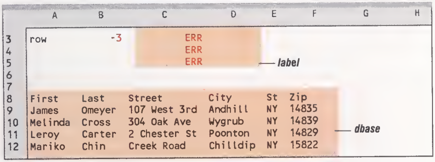
STORE YOUR PRINT SETTINGS IN MACROS

A collection of simple macros for 1-2-3 *Release 2/2.01 can ease many printing chores.*

BY DANIEL GASTEIGER

As your worksheet becomes more complex, you're more likely to use it to print several dissimilar reports. Perhaps one report requires page breaks with headers and footers, another needs to be unformatted (without page breaks), and yet another calls for compressed print and a page length of only 40 lines.

Many people select new options from the Print menus each time they print a report. If you only occasionally print different reports from one worksheet, changing these options isn't too much trouble. But if you repeatedly create the same reports from a single worksheet, marching through the menus for each report is a waste of time. Consider storing your print settings as macros.



	A	B	C	D	E	F	G	H
3	row	-3	ERR					
4			ERR					
5			ERR					
6								
7								
8	First	Last	Street	City	St	Zip		
9	James	Omeyer	107 West 3rd	Andhill	NY	14835		
10	Melinda	Cross	304 Oak Ave	Wygrub	NY	14839		
11	Leroy	Carter	2 Chester St	Poonton	NY	14829		
12	Mariko	Chin	Creek Road	Chilldip	NY	15822		

HOW TO SET UP THE WORKSHEET

1. Individual column widths

Column	Width
B	8
C	14
D	10
E	4

For example, to set the width of column B, place the cell pointer in column B, select /Worksheet Column Set-Width, and enter 8.

2. Labels

Enter the labels shown in figure 1, but omit the entries shown in red. Note that even the zip codes in column F are labels. Precede each label entry that starts with a number with an apostrophe label-prefix character.

3. Range names

Names	Range
row	B3
dbase	A8..F12

Select /Range Name Labels Right and indicate cell A3. Then select /Range Name Create, enter dbase, and indicate range A8..F12.

4. Enter and copy formulas

Cell	Formula
B3	@CELLPOINTER("row")–@CELL("row",dbase)
C3	@INDEX(dbase,0,row)&" "&@INDEX(dbase,1,row)
C4	@INDEX(dbase,2,row)
C5	@INDEX(dbase,3,row)&", "&@INDEX(dbase,4,row)&" "&@INDEX(dbase,5,row)

Note that there is a single space both between the quotation marks in the formula for cell C3 and after the comma that is between the quotation marks in cell C5's formula. Three spaces are within the second set of quotation marks in the formula in cell C5. Never mind that some of the formulas return ERR as you enter them.

A Multireport Worksheet

To create a macro to serve each of your printing needs, first follow the instructions in the "How to Set Up the Worksheet" box to create the worksheet that appears above it.

The database and formulas you've created work together to provide two distinct formats in which to print data from the worksheet. Identifying the database (range A8..F12) as the Print range results in *1-2-3*'s printing a copy of the database exactly as it appears on your display.

The formulas in range B3..C5 provide the second print format, letting you print any database record arranged in a block as it would be on a mailing label. To see how this works, move the cell pointer to the first database record (row 9), and press the CALC key (the F9 key on most computers). *1-2-3* updates the formulas to reveal the information from the first database record structured as a mailing label. Understanding exactly how the formulas work isn't important to following this discussion.

There may be times that you would like to print a database of this type as it appears in the worksheet. When the database contains several hundred records, *1-2-3* should paginate the printout automatically and include a row of field names as the top border of each page.

On the other hand, when you want to print a single address label, you need to print range C3..D5 with no page breaks and no borders. This is where the macros come in.

Print-Settings Macros

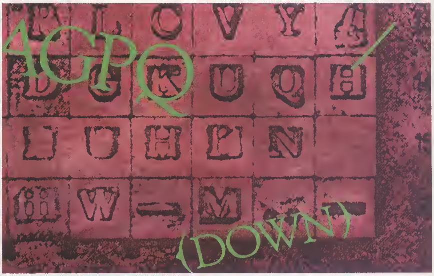
The screen below shows two macros. The first one prints the Database range as it appears on the screen. The second prints an address label for the record that is in the row holding the cell pointer.

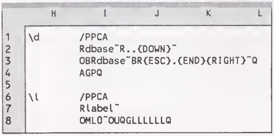
To create these macros, enter the labels as shown, remembering to start each of the entries in cells H1, I1, H6, and I6 with an apostrophe label prefix. Use the Range Name Labels Right command to assign the labels in range H1..H6 as names for the adjacent cells of column I. Then use the Range Name Create command to assign the name *label* to range C3..D5. The macros are ready to run.

Make sure your printer is on-line. Then try the first macro by holding down the MACRO key (Alt on most computers) and pressing D. *1-2-3* prints the database, and your printer ejects paper to the beginning of the next page. Here's what the macro does:

/PPCA selects /Print Printer Clear All. This resets *1-2-3*'s print settings to the default, which is whatever they normally are when you begin a *1-2-3* work session.

Rdbase~R..{DOWN}~ selects Range, enters *dbase* as the Print range, then selects Range a second time, presses a period twice, and presses the DownArrow key and Return. These steps may seem convoluted, since all they do is assign the database records (minus the field names) as the Print range. However, by first assigning *dbase* as the Print range, then decreasing the range by dropping its first row, the macro can assign the necessary range without needing a unique range name to identify the database records. Identifying ranges this way can reduce the number of steps involved in creating a macro.





```
        H         I         J         K         L
1   \d        /PPCA
2             Rdbase~R..{DOWN}~
3             OBRdbase~BR{ESC}.{END}{RIGHT}~Q
4             AGPQ
5
6   \l        /PPCA
7             Rlabel~
8             OMLO~OUQGLLLLLLQ
```

CHRIS MCALLISTER

OBRdbase~BR{ESC}.{END}{RIGHT}~Q selects Options Borders Rows, enters *dbase* as the Borders range, then selects Borders Rows. Next it presses the Escape key, a period, End Right Return, and selects Quit. This sets the row of database field names as the Borders range, which *1-2-3* will print as the first line of each page of the document.

AGPQ selects Align Go Page Quit. This causes *1-2-3* to print the database. For these four records, *1-2-3* leaves space for a header and a top margin, then prints the row of field names as a top border. Directly beneath this border, *1-2-3* prints the database records. For much larger databases, *1-2-3* fills most of the page with database records, but leaves a bottom margin and room for a page footer. Then *1-2-3* ejects the page, leaves space for a header and a margin at the top of the next page, prints the border of field names on this page, and prints a second page of database records. This process continues until *1-2-3* has printed every record in the database.

Use the second macro to print a database record as it would look on an address label. To do this, move the cell pointer to the row of the record you wish to print—say, row 12—then press the CALC key. Mariko Chin's name and address appear in the range named *label* (C3..D5). Now hold down the MACRO key and press L. Here's what the macro does:

/PPCA selects /Print Printer Clear All and resets all print settings to the default settings.

Rlabel~ selects Range and indicates the range named *label* as the Print range.

OML0~OUQGLLLLLLQ selects Options Margins Left, enters 0, then selects Other Unformatted Quit Go Line (six times) Quit.

By setting the left margin to 0, the macro causes *1-2-3* to print the address label at the left edge of the paper. You can alter this positioning by changing the 0 in the macro command to some other number. For example, replacing the 0 with 30 centers the label on an 8½-by-11-inch page.

By selecting Other Unformatted, the macro eliminates page breaks, headers, and footers from the printout. This makes *1-2-3* print the label, starting on your printer paper's first available line.

After *1-2-3* prints the label, the macro selects Line six times to partially eject the paper from the printer and provide spaces to separate that label from any labels or text that might follow. You can adjust the spacing by adding or deleting L's in the last line of the macro.

Storing print settings is as easy as recording the keystrokes you use to create them. The only trick in the macros we've explored is the use of the range name *dbase* to establish related print and border ranges.

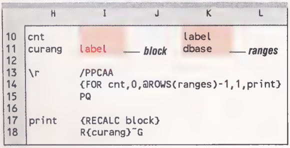
To create your own print-settings macros, first make the settings manually and keep track of the keys you press. Then enter the keystrokes into the worksheet as labels and assign them a macro name.

One Report, Several Ranges

Storing print settings doesn't do the job for some reports. For example, suppose you want to produce a report that has one print format throughout but includes information from several ranges.

Perhaps you'll create an inventory database, a budget model, and a sales-projection model, all within a single worksheet. Imagine that you need to print one report that includes the database, the budget model, the sales projections, and a summary. The macro shown below can do this. You simply list the ranges you wish to print and the macro does the rest.

Create the macro in your existing worksheet. Enter the labels as shown, but omit for the moment the label shown in red. Assign the labels in column H as names for the adjacent cells of column I: Select /Range Name Labels Right, and indicate range H10..H17. Also, assign the name *ranges* to range K10..K11, and assign the name *block* to range I10..I11. Finally, enter the formula @INDEX(ranges, 0,cnt) in the cell named *curang* (I11).



```
        H         I          J          K          L
10    cnt                              label
11    curang    label                  dbase
12
13    \r        /PPCAA
14              {FOR cnt,0,@ROWS(ranges)-1,1,print}
15              PQ
16
17    print     {RECALC block}
18              R{curang}~G
```

To use the macro, hold down the MACRO key and press R. *1-2-3* resets the print settings to their default status and prints the range named *label* and then the range named *dbase*. Granted, you normally wouldn't print these two ranges in this way, but the exercise demonstrates the macro in action. Here's what the macro does:

> ■
>
> *Storing print settings is as easy as recording the keystrokes you use to create them.*
>
> ■

/PPCAA selects /Print Printer Clear All Align. This resets the print settings to their defaults and signals to *1-2-3* that the print head is aligned with the top of a page.

{FOR cnt,0,@ROWS(ranges) − 1,1, print} controls a FOR loop. This {FOR} command processes the routine named *print* once for each entry in the range named *ranges*. The {FOR} command starts by setting the value of *cnt* to 0. Each time the macro processes the *print* routine, the {FOR} command increases the value of *cnt* by 1. When the value of *cnt* exceeds the value of the expression @ROWS(ranges) − 1, the {FOR} command is finished and macro control passes to the commands in cell I15. Here's what the *print* routine does:

{RECALC block} updates the formula in *curang* based on the current value of *cnt*, which changes with each iteration of the {FOR} command. On the macro's first loop, *cnt* has the value 0. On the second loop, *cnt* has the value 1, and so on. The @INDEX formula in *curang* uses the cell named *cnt* as its row-offset argument. On the loop's first pass, the formula returns the first label from the list of labels in *ranges*. On the loop's second pass, the formula returns the second label from the list, and so on.

R{curang}~G selects Range from the Print menu, then calls *curang* as a subroutine, presses Return, and selects Go. By calling *curang* as a subroutine, the macro types the range name listed in *curang*, thereby identifying it as the name of the range to print. When the {FOR} command has processed the *print* routine once for each of the ranges listed in *ranges*, macro control passes to the commands PQ in cell I15. These commands select Page Quit from the Print menu, causing *1-2-3* to eject a page from the printer and then quit from the Print menu.

You can use this macro in any worksheet to print any ranges you select. Starting in the first cell of *ranges* (K10), simply list the ranges you wish to print. If your report includes more than two ranges, use the Range Name Create command to reassign *ranges* so that it includes all of the range names in your list.

Store Your Settings

Macros make it easy to print standard reports from your worksheets. In a large worksheet you probably reset only the Print range from one report to the next, as the previous macro does. But consigning this task to macros might encourage you to explore other print options more thoroughly.

Perhaps some reports would look better if printed in compressed or expanded type. For those reports a macro can quickly modify the printer setup string (select /Print Printer Options Setup). Other reports may include borders, as did the one we created earlier. Still others might simply list the contents of the cells in a specific range (select /Print Printer Options Other Cell-Formulas). ■

Daniel Gasteiger is LOTUS*'s editor for the Macros and Technical Section.*

SETUP STRINGS CAN CONTROL PRINTING

Enhance your printed worksheets with bold, italic, compressed, underlined type, and more.

BY CHRIS BROWN

The problem: You're not satisfied with the unadorned printouts of your *1-2-3* and *Symphony* worksheets. You want to print some labels in bold type and others in italic, underline a row of important values, and print the entire worksheet with double spacing.

The solution: Use setup strings.

This article describes two methods of using setup strings in *1-2-3* and initialization strings in *Symphony*. With one technique, you enter setup strings in the Print menu; with the other, you enter setup strings in worksheet cells.

Let's begin by defining the term "setup string." Also called a printer-control sequence, or in *Symphony* an initialization string, a setup string is a series of characters that *1-2-3* and *Symphony* send to your printer to direct it to produce special output.

A setup string that you enter from the Print menu affects the entire specified Print range. A setup string that you embed in a worksheet cell affects the content of only the rows that are below the row containing the string. By entering a series of setup strings in a worksheet, you can turn various print attributes on and off and alter the print for specific portions of the worksheet.

In order to be in control of your printed output, you need to know the setup strings that apply to your printer. The table lists setup strings for a variety of print attributes and printers. If your printer is not listed, consult your printer manual for the setup strings your printer requires. Your manual may refer to setup strings by a variety of names, including printer codes, attribute codes, mode commands, print commands, or character-string functions.

From the Print Menu

Start your experimentation with setup strings entered in the Print menu. Select /Print Printer Options Setup (in *Symphony*, SERVICES Print Settings Init-String). At the prompt *Enter Setup String:* (in *Symphony*, *Printer-control sequence:*), enter the string that creates the printed effect you want. For example, if you use an Epson MX series printer and want to print a worksheet in compressed mode, enter \015. When you print the worksheet, the entire specified Print range appears in compressed format.

You precede the numerical portion of the string by a backslash (\) character. All setup strings in *1-2-3* and *Symphony* require this convention. Most setup strings contain three digits, although some contain more. Still others include uppercase and lowercase letters, as well as symbols such as the at sign (@), ampersand (&), and exclamation point (!).

To obtain even more print attributes, you can conjoin individual setup strings. *1-2-3* and *Symphony* setup strings can be up to 39 characters long. For example, suppose you want to print a wide worksheet in compressed type with double spacing. Looking at the table, you see that the setup string for double spacing on an Epson MX series printer is \027\065\024. This string can be joined to the string for compressed type (\015). The result is \015\027\065\024. Enter this setup string at the prompt, and everything in the Print range appears in compressed type with double spacing.

When you use special print modes such as compressed, you may need to adjust other print settings to accommodate the style of printing. For instance, since compressed type squeezes extra characters on each line, widen the right margin to 132 characters if you're printing in portrait mode on 8½-inch by 11-inch paper. For large worksheets you might want a page length longer than 66 lines. For example, if you use a setup string to set line spacing to 8 lines per inch and you use 8½-inch by 11-inch paper, you can set the page length to 88 lines.

To cancel the setup string and return to normal printing, select /Print Printer Options Setup (in *Symphony*, SERVICES Print Settings Init-String). Press Escape and then Return. Now no special instructions are sent to the printer when you select the Align Go commands from the Print menu. In *1-2-3* you can also select /Print Printer Clear Format from the Print menu to cancel the setup string. Note that this also returns the margins and page length to the default settings.

When you cancel a setup string, your printer may not recognize that fact and continue to print in the special mode. This occurs because the printer has stored the setup string in its memory. There are two ways to return your printer to normal operation: Turn it off for a few seconds and then turn it back on, or enter a master reset setup string from the Print menu. The table includes master reset strings for several printers.

Default Setup Strings

Both *1-2-3* and *Symphony* allow you to specify a default setup string. This is handy if you use a particular string every time you print a worksheet. When you enter a default setup string, it automatically appears next to the prompt for the setup string in the Print menu. Now any time you select Print, the setup string is sent to your printer to control

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printing. To enter a default setup string in *1-2-3*, select /Worksheet Global Default Printer Setup and enter the string. Select Quit Update Quit to save the string as a global default setting. (In *Symphony* select SERVICES Configuration Printer Init-String, enter the string, and select Quit Update Quit.) You can override a default setup string by entering another setup string from the Print menu. You can delete default setup strings the same way you delete other setup strings: by pressing the Escape key at the Print menu.

Using Embedded Setup Strings

Suppose you want to print only a portion of a worksheet in a special way. You can do so in *1-2-3* Release 2/2.01 by embedding setup strings in worksheet cells. (You cannot use embedded setup strings in *1-2-3* Release 1A.) This allows you to print entire rows of information with various attributes. Embedded setup strings are identical to the setup strings that you enter from the Print menu, with one exception: You must precede them with two split vertical bars (¦¦). *1-2-3* and *Symphony* recognize the first vertical bar as a label prefix. The second vertical bar indicates that the numbers that follow are printer-control codes. (Only the second split vertical bar is displayed.)

1-2-3 and *Symphony* print entire worksheet rows that follow embedded setup strings, using the attributes you assign. Even if you use embedded setup strings, you cannot print individual cells or columns of a worksheet in a special way. Keep the printed output in mind when designing a worksheet. If you know that you want a special printed effect in a section of the worksheet, lay out that section in a row-wise rather than a column-wise format.

Follow these four steps to embed setup strings in your worksheet:

1. Insert a row in the worksheet immediately above the area that you want to be printed using a special attribute.

2. Move the cell pointer to the leftmost cell of the range you wish to print, and enter the desired setup string. Remember to precede the setup string with two split vertical bars.

3. Insert a row immediately below the last row of the area you want to be printed using special attributes.

4. In the leftmost cell of this row, enter a setup string that cancels the print attribute you entered earlier. If no such string exists, enter your printer's master reset setup string. Once again, precede this string with two split vertical bars.

When you define the Print range, include the rows containing the embedded setup strings. *1-2-3* and *Symphony* do not print the rows containing setup strings. A single Print range can have as many areas as you like that contain special attributes, but each area must be set off by rows containing setup strings that turn the print attributes on and off.

Take a look at the figure. This simple worksheet contains setup strings that produce three printed special effects on

SETUP AND INITIALIZATION STRINGS CATEGORIZED BY PRINTER AND PRINT MODE

	Compressed	Elite (12 cpi)[1]	Pica (10 cpi)	Expanded	Double Spacing (3 lines per inch)	Standard Spacing (6 lines per inch)	8 lines per inch
C.Itoh 8510A	\027Q	\027E	\027N	\014	\027T48	\027A	\027B
DEC LA100	\027[4w			\027[5w	\027[3z	\027[0z	\027[2z
Epson FX, MX, or RX	\015	\027M[2]	\027P	\027W1	\027\065\024	\0272	\0270
Epson LQ1500	\027x0\015	\027M	\027P	\027W1	\027\065\024	\0272	\0270
HP LaserJet[3]	\027&k2S	\027(s12H	\027&k0S		\027&*l*3D[4]	\027&*l*6D[4]	\027&*l*8D[4]
HP ThinkJet[5]	\027&k2S	\027&k0S	\027&k3S	\027&k1S		\027&*l*6D[4]	\027&*l*8D[4]
IBM 5182 Color Printer	\015	\027\058	\018	\027\087\001		\027\050	\027\048
IBM Color Jetprinter	\015		\018	\027\087\001	\027\087\001	\027\050	\027\048
IBM Graphics	\015	\027\058	\018	\027\087\001		\027\050	\027\048
IBM Proprinter	\015	\027	\018	\027\087\001\014	\027\051\0272	\027\050	\027\048
IBM QuietWriter, Models 1 & 2	see note[6]			\027\087\049	\027\065\024\027\050	\027\050	\027\048
IDS Prism 80/132[7]	\031	\030	\029	\01	\027,B,16,$	\027,B,8,$	\027,B,6,$
Okidata Microline	\029	\028	\030	\030\031	\027\037\057\048	\027\054	\027\056
Okidata Pacemark	\027\066	\027\065	\027\054	\027\054\027\067	\027\037\057\048	\027\052	\027\053
Okidata Pacemark and Microline (IBM-Compatible Versions)	\015	\027\058	\018	\027\087\049	\027\041\024	\027\065\012	\027\048
Star Micronics Gemini	\015	\027\066\002	\027\066\001	\027\087\001	\027\065\024	\050	\0270\048
TI 850, 850XL, 855[8], 865[8]	\027P	\027z	\027y	\014[9]	\027\065\024	\0272	\0270
Toshiba P351, P1350, P1351 321SL, 351SX, 321LC, 351C	\027*0\027[	\027*1\027E10	\027*1\027E12	\027!	\027L16	\027L08	\027L06

[1] Characters per inch

[2] Does not work for Epson MX series printers.

[3] Begin the first setup string with the string for portrait mode, \027E\027&*l*00, or landscape mode, \027E\027&*l*10.

[4] The character in italics is a lowercase L.

[5] Reads these strings with DIP switch 5 down. With DIP switch 5 up, reads strings for Epson MX printers or the IBM Proprinter.

[6] Use \015\027\073\048 if 15-pitch font is in A slot; use \015\027\073\049 if 15-pitch font is in alternate slot

[7] Many of the available print modes are DIP-switch selectable and do not require setup strings.

[8] DIP switch 4 must be in the Off position for the 855 and 865 models to read setup strings.

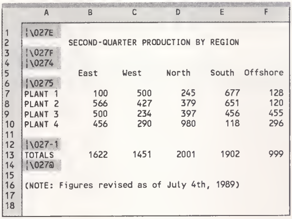
[9] Must be set at the beginning of each line.

[10] Not available for the P1350 model.

an Epson MX series printer. When you print the worksheet, the title in row 2 will appear in emphasized type. The territories in row 5 will appear in italics, and the totals in row 13 will be underlined. Setup strings in column A create these print effects. In each case, one setup string turns on a special effect and another turns it off. The master reset setup string in cell A14 cancels the effects of all previous setup strings and returns the printer to normal operation.

The techniques of using setup strings are not difficult to master. However, getting the desired printed results from a particular printer may not be as straightforward. Because of printer idiosyncrasies, observe the following caveats when working with setup strings:

1. Some printers require you to combine two or more setup strings to create a special effect. For example, the Epson LQ1500 can produce compressed print only when in the draft mode. Thus, you must supply this printer with setup strings for both compressed printing and draft mode in order to produce compressed print. The table contains strings for similar cases.



```
         A          B          C          D          E          F
 1   |\027E
 2            SECOND-QUARTER PRODUCTION BY REGION
 3   |\027F
 4   |\0274
 5                East       West       North      South   Offshore
 6   |\0275
 7   PLANT 1       100        500        245        677        128
 8   PLANT 2       566        427        379        651        120
 9   PLANT 3       500        234        397        456        455
10   PLANT 4       456        290        980        118        296
11
12   |\027-1
13   TOTALS       1622       1451       2001       1902        999
14   |\027@
15
16   (NOTE: Figures revised as of July 4th, 1989)
17
18
```

The setup strings in the highlighted cells of column A in this worksheet direct an Epson MX series printer to print the title in boldface in row 2 and the territories in Italics in row 5 and to underline the totals in row 13. Rows containing setup strings are inserted above and below each row that will be printed with an attribute. A master reset setup string in cell A14 returns the printer to normal operation.

2. Some printers provide more printer-control sequences than others. As the table illustrates, several printers do not support letter-quality printing, italic print, and double spacing. Consult your printer manual to find out what print attributes your printer can generate.

3. If you use a laser printer, the font cartridge you choose determines which print attributes are available. See "How to Print Worksheets on the LaserJet" on page 68 for solutions to problems encountered in using *1-2-3* and *Symphony* with the HP LaserJet. ■

Chris Brown is senior editor of features for LOTUS.

Letter Quality (or Near Letter Quality)	Emphasized	Cancel Emphasized	Underlined	Cancel Underlined	Italic	Cancel Italic	Master Reset
	\027!	\027\034	\027X				
\027[3"z			\027[4m	\027[0m			
	\027E	\027F	\027-1	\027-0	\0274	\0275	\027@
\027x1	\027E	\027F	\027\045\001	\027\045\000	\0274	\0275	\027@
	\027(s3B	\027(s0B	\027&dD	\027&d@	\027(s1S	\027(s0S	\027E
	\027(s1B	\027(s0B	\027-1\027&dD	\027&d@			\027E
\027\073\002	\027\069	\027\070	\027\045\001	\027\045\009			
\027\073\002	\027\071	\027\070	\027\045\001	\027\045\000			
	\027\069	\027\070	\027\045\001	\027\045\000			
\027\073\002	\027069	\027\070	\027\045\001	\027\045\000			\024
			\027\045\001	\027\045\000			
\027\049	\027\084	\027\073	\027\067	\027\068	\027\033\047	\027\033\042	\027\024
\027\055	\027\066\027\067	\027\090\027\054	\027\085	\027\086			
\027\073\051	\015\027\087\049	\027\087\048\018	\027\045\001	\027\045\000	\027\033\047	\027\033\042	
	\027\069	\027\070	\027-1	\027\045\000	\027\052	\027\053	\027\064
\027q (TI 855/856 only)	\027G	\027H		\027@			
\027*2	\027K2	\027\077\027M		\027\018[10]	\027\020[10]	\027\0261	

Note: The strings shown have been verified by the manufacturers. If you discover a string that causes a problem, please let us know. Write to: Setup Strings, *LOTUS* Magazine, P.O. Box 9123, Cambridge, MA 02139-9123.

UPDATE: LOTUS PRINTER DRIVERS

Printers for Text and Graphics	1-2-3 Release 1A	1-2-3 Release 2	1-2-3 Release 2.01	Symphony Release 1	Symphony Release 1.1	Symphony Release 1.2	Symphony Release 2.0
Advanced Matrix Technology AMT-2003, color matrix	H	H	H		H	H	
Anadex 9620A Silent Scribe, dot-matrix	PGraph	Sup	Sup	Sup	Sup	Sup	Sup-SD
Apple LaserWriter and LaserWriter Plus		E,F	E,F		F	F	F
AST TurboLaser		E,F	E,F		F	F	F
Brother Twinriter 5		I	1		I	1	
Canon A-1210, color ink-jet	GPLI	Sup	Sup	Sup	Sup	Sup	Sup-SD
Canon PJ-1080A, color ink-jet	GPLII	Sup	Sup	Sup	Sup	Sup	Sup-SD
C. Itoh ProWriter 8510 series, dot-matrix	GPL1	Sup	Sup	Sup	Sup	Sup	Sup
Datasouth DS-180 Plus, dot-matrix		H	H		H	H	
DEC-LA75, dot-matrix		B	P		B		
DEC-LA100, dot-matrix	GLPI	Sup	Sup	Sup	Sup	Sup	Sup-SD
Diablo Model C-150, color ink-jet	GPLI	Sup	Sup	Sup	Sup	Sup	Sup-SD
Epson EX-800, B&W/color dot-matrix		N	N		N		
Epson FX-80, dot-matrix	PGraph	Sup,F	Sup,F	Sup	Sup,F	Sup,F	Sup,F
Epson FX-85, dot-matrix		J,F	J,F		J,F	J,F	F
Epson FX-100, dot-matrix	GPLI	Sup,F	Sup,F	Sup	Sup,F	Sup,F	Sup,F
Epson FX-286, dot-matrix		J,F	J,F		J,F	J,F	F
Epson GQ-3500		G,H	G,H		H	G,H	Sup
Epson JX-80, color dot-matrix	GPLI1	Sup	Sup	Sup	Sup	Sup	Sup,F
Epson LQ-800 and LQ-1000, letter-quality		G	G		G	G	
Epson LQ-1500	GPLII	Sup	Sup,F	Sup	Sup,F	Sup,F	Sup,F
Epson LQ-2500		G	G,H		H	G	Sup
Epson MX-80 and MX-100, dot-matrix with Graf-Trax Plus	PGraph	Sup	Sup	Sup	Sup	Sup	Sup
Epson RX-80 and RX-100, dot-matrix	GPLII	Sup,F	Sup,F	Sup,F	Sup,F	Sup,F	Sup,F
Genicom 3000 series, B&W/color dot-matrix	GPL1	Sup	Sup	Sup	Sup	Sup	Sup-SD
HP 2225 or 2225A ThinkJet, ink-jet	GPLII	Sup	Sup	Sup	Sup	Sup	Sup
HP 2227 or 2227A QuietJet Plus, ink-jet	H	H	H	H	H	H	
HP 2276A DeskJet, ink-jet							Sup
HP 2686A LaserJet	GPLII	Sup	Sup	Sup	Sup	Sup	Sup
HP 2686A Option 300 LaserJet Plus	H	H	Sup	H	H	Sup	Sup
HP 2686D LaserJet 500 Plus	H,L	H,L	H,L	H,L	H,L	H,L	Sup
HP 2930, dot-matrix	H	Sup	Sup	Sup	Sup	Sup	Sup
HP 33440A LaserJet Series I1			L			L	
HP 3630 PaintJet							Sup
IBM 5152 Personal Computer Graphics, dot-matrix	PGraph	Sup,F	Sup,F	Sup,F	Sup,F	Sup,F	Sup,F
IBM Color Graphics, dot-matrix	GPLII	Sup	Sup	Sup	Sup	Sup	Sup
IBM 3852 Color Jetprinter Model 2	A	Sup	Sup	A	Sup	Sup	Sup
IBM 3812 Pageprinter	B	D,H	Sup	B	D,H	Sup	Sup
IBM 4201-1 Proprinter, dot-matrix	B	B	Sup	B	B	Sup	Sup
IBM 4201-2 Proprinter II, dot-matrix			P			P	

LEGEND

A	Driver available from IBM and the World of Lotus on CompuServe
B	Uses IBM Graphics Printer Drivers
C	Uses IBM Graphics Printer Driver for text
D	Driver available from the World of Lotus on CompuServe
E	Driver available in *1-2-3* Value Pack
F	Driver available in Lotus InTune
G	Uses Epson LQ-1500 driver
H	Drivers available from Phoenix Technologies Ltd.
I	Uses Diablo 630 driver for text, Epson FX-80 driver for graphics
J	Uses Epson FX and RX series drivers for text and graphics
K	Drivers available in hardware packaging and from manufacturer
L	Uses HP LaserJet Plus drivers for text and graphics
M	Uses driver for corresponding HP plotter
N	Uses Epson FX and RX series drivers for text, JX drivers for graphics
O	Uses Toshiba P1350 drivers for text and graphics
P	Uses IBM Proprinter or Proprinter XL driver
Q	Uses IBM Quietwriter or Graphics drivers for text, IBM Quietwriter II for graphics
R	Uses IBM Quietwriter or Graphics drivers for text, IBM Graphics driver for graphs
PGraph	Available on PrintGraph Disk for *1-2-3* Release 1A
SD	Single driver available on Speller Dictionary Disk (5¼-inch version) and Speller & Outliner add-ins disk (3½-inch version)
Sup	Supplied by Lotus Development Corp. with specified release of *1-2-3* or *Symphony*
GPLI	Driver on Graphics Printer Library I, available from Lotus Development Corp.
GPLII	Driver on Graphics Printer Library II, available from Lotus Development Corp.

Note: Information in this chart is from many sources, including Lotus Development Corp.'s Information and Warranty Department, the Lotus Product Guide published by Lotus Development Corp., and Phoenix Technologies Ltd.

Printers for Text and Graphics	1-2-3 Release 1A	1-2-3 Release 2	1-2-3 Release 2.01	Symphony Release 1	Symphony Release 1.1	Symphony Release 1.2	Symphony Release 2.0
IBM 4202-1 Proprinter XL, dot-matrix		B	Sup		B	Sup	Sup
IBM 4208-I Proprinter XL/24			P			P	
IBM Quietwriter Model 2, thermal-transfer (5201-2)			Sup			Sup	Sup
IBM Quietwriter III, thermal-transfer (5202-1)		R	Q		R	Q	
IDS Prism 80 and 132, color dot-matrix	PGraph	Sup	Sup	Sup	Sup	Sup	Sup
Inforunner Riteman 280, dot-matrix	GPLI	Sup	Sup	Sup	Sup	Sup	Sup-SD
Infoscribe 1200, color dot-matrix	GPLI	Sup	Sup	Sup	Sup	Sup	Sup-SD
MPI PrintMate 150, dot-matrix	GPLI	Sup	Sup	Sup	Sup	Sup	Sup-SD
NEC 8023, dot-matrix	PGraph	Sup	Sup	Sup	Sup	Sup	Sup
NEC Pinwriters (P5, P5XL, P6, P7)		H	H		H	H	
NEC Silentwriter LC890		E,F	E,F		F	F	F
Okidata Microline Series (82A, 83A, 84, 92, 93), dot-matrix	PGraph	Sup	Sup	Sup	Sup	Sup	Sup
Okidata Microline 292-I and 293-1		H	H		H	H	
Okidata Pacemark 2410, dot-matrix	GPLII	Sup	Sup	Sup	Sup	Sup	Sup
Printek 920, dot-matrix	GPLI	Sup	Sup	Sup	Sup	Sup	Sup-SD
Printronix MVP 150B, dot-matrix	GPLI	Sup	Sup	Sup	Sup	Sup	Sup-SD
Quadram Quadjet, color ink-jet	GPLII	Sup	Sup	Sup	Sup	Sup	Sup-SD
Quadram QuadLaser		H	H		H	H	
Star Micronics Gemini 10X and 15X, dot-matrix	GPLI	Sup	Sup	Sup	Sup	Sup	Sup
Tandy DMP 130A, 430A, and 2110			P				
Texas Instruments T1850, dot-matrix	GPLI	Sup	Sup	Sup	Sup	Sup	Sup
Texas Instruments T1855, dot-matrix	GPLII	Sup	Sup	Sup	Sup	Sup	Sup
Toshiba P351, dot-matrix		0	0		0		Sup
Toshiba P351C, dot-matrix		H	H		H	H	Sup
Toshiba P1350 series, dot-matrix	GPLI	Sup	Sup	Sup	Sup	Sup	
Toshiba PageLaser 12							H
Transtar T315 or Vivitar/Transtar 315, color dot-matrix	GPLI	Sup	Sup	Sup	Sup	Sup	Sup-SD
Xerox 4020 ColorJet							H
Xerox 4045, laser		H	H		H	H	Sup
Printers for Text Only							
Diablo 630, daisy-wheel		Sup	Sup	Sup	Sup	Sup	Sup
IBM Quietwriter, thermal-transfer		Sup	Sup	C	Sup	Sup	Sup
NEC 3550 Spinwriter		H	H		H	H	Sup
Qume Sprint 11/40, daisy-wheel		Sup	Sup	Sup	Sup	Sup	Sup
Ricoh LP4080R and 6000, laser		H	H		H	H	
Plotters for Graphics Only							
Amdek Amplot II, 6-pen	GPLI	Sup	Sup	Sup	Sup	Sup	Sup
Calcomp Model 84, 8-pen	GPLI	Sup	Sup	Sup	Sup	Sup	Sup
Calcomp ColorMaster	K	K	K	K	K	K	
Enter Sweet P, 1-pen	PGraph	Sup	Sup	Sup	Sup	Sup	Sup-SD
Epson HI-80, 4-pen	D	D	Sup	D	D	Sup	Sup
HP 3630A PaintJet		H	H		H	H	
HP 7440A ColorPro, 8-pen	H	H	Sup	H	H	Sup	Sup
HP 7470A, 2-pen	PGraph	Sup	Sup	Sup	Sup	Sup	Sup
HP 7475A, 6-pen	GPLI	Sup	Sup	Sup	Sup	Sup	Sup
HP 7550 or 7550A, 8-pen	GPLII	Sup	Sup	Sup	Sup	Sup	Sup
Houston Instrument DMP-29, 8-pen	GPLI	Sup	Sup	Sup	Sup	Sup	Sup
IBM 7371, 2-pen; 7372, 6-pen; 6180, 8-pen		M	M		M	M	
IBM XY/749, 8-pen	GPLI	Sup	Sup	Sup	Sup	Sup	Sup
Strobe M100, 1-pen	PGraph	Sup	Sup	Sup	Sup	Sup	Sup-SD
Strobe M200, 1-pen	GPLI	Sup	Sup	Sup	Sup	Sup	Sup-SD
Strobe M260				Sup			

HOW TO PRINT WORKSHEETS ON A LASERJET

When the folks in Lotus Product Support answer the phone, they hear these questions.

BY PHYLLIS A. SHARON

Remember life before the LaserJet? Those were the days of the friendly, compliant dot-matrix printer. Sure, it was a little noisy, and the print quality was bland. But you could always get what you asked for.

Now you're using a Hewlett-Packard LaserJet Plus or Series II printer. And you may have discovered, perhaps the hard way, that printing worksheets isn't as easy as it used to be. With choice comes complexity, and the myriad options the LaserJet offers can make printing the simplest worksheet a struggle.

We went to the experts in Lotus Product Support to find out what questions you're asking about how to get quality worksheet printouts on a LaserJet. Here are your questions and how they answered them. Note that in escape codes throughout the text, a lowercase letter L appears in italics (*l*) so as not to be confused with the numeral 1 and zeros appear with a slash (Ø) so as not to be confused with an uppercase letter O.

1. How can I print multiple ranges on a single page?

Follow these easy steps to print a series of ranges on one page:

- To print the first of a series of ranges on a single page, in *1-2-3* press slash and select Print Printer Range (in *Symphony* press SERVICES and select Print Settings Source Range), specify the first range to be printed, and then select Align Go (in *Symphony*, Quit Align Go).
- To print the second and subsequent ranges, simply specify the range and then select Go (in *Symphony*, Quit Go). Note, however, that you must not reselect Align before selecting Go, or you'll end up with wide gaps in the printout.

If you use *1-2-3* Release 2 or *Symphony* Release 1.1 with the LaserJet Plus printer driver, you may have trouble printing multiple ranges on one page. The problem occurs because the LaserJet Plus driver includes a reset code that automatically ejects the paper when it thinks it's at the end of a print job. If you experience trouble, go back through the Install program and specify the Unlisted No-Backspace printer driver.

2. Why can't I get the last page out of the printer?

The LaserJet is a page printer, which means that it stores the contents of each page in a buffer and will not print anything until it is sure that it has composed an entire page. Unless it receives the master reset escape code (\027E), the form-feed code (\012), an embedded page-break symbol, a page-advance command from the *1-2-3* or *Symphony* Print menu, or until you press the Form Feed key on the printer, it will not print the page. Instead, the data remains in the buffer and is printed out at the beginning of the next print job.

Although all five options work, it's best to use only two: an embedded page break or a page-advance command from the Print menu. The reason for this is that if you're using headers or footers, sending an escape code or pressing the Form Feed key on the printer bypasses *1-2-3* and *Symphony*. Therefore, you often will not get the appropriate pagination or your headers and footers will print out improperly.

In all releases of *1-2-3* and *Symphony*, you can select Page (in *Symphony*, Page-Advance) from the Print menu. As an alternative, in *1-2-3* Release 2/2.01 and all releases of *Symphony*, you can embed a page break. To do so, move the pointer to the row immediately below the last row of the range to be printed. If this row contains data, insert a row by selecting /Worksheet Insert Row (in *Symphony*, MENU Insert Rows) and pressing Return. If the row is blank, you don't need to insert a new row. To embed a page break, move the pointer to the leftmost column of the row in the range to be printed, and select /Worksheet Page (in *Symphony* enter a split vertical bar and two colons). A double colon appears in the current cell. Include the row containing the page-break symbol in the Print range.

3. Why does the page mysteriously eject itself in the middle of a print job?

This problem often occurs when you use embedded escape codes within a worksheet to turn on and off print attributes, such as underlining, boldface, and so on, and you begin each escape code with \027E. This master reset code not only clears all the prior settings but also ejects the page from the printer. The LaserJet's documentation suggests that you include this code at the start of each escape code; however, doing so results in random page ejection. So do not begin embedded escape codes with \027E, and you won't have this trouble.

CHRIS McALLISTER

4. How do I shorten a long escape code?

If you want to specify an escape code in the Setup (in *Symphony*, Init-String) option on the Print menu and the code exceeds 39 characters, use the following guidelines to compress, or concatenate, the code:

- The first two characters after the \027 must be the same in all escape codes you want to combine.
- All alphabetic characters within each combined printer command must be lowercase, except the final letter, which must always be uppercase.

Consider how you might shorten the following escape code, which defines landscape orientation, USASCII symbol set, compressed, 7-point, upright, medium-weight Prestige type:

\027&*l*1O\027(0U\027&k2S
\027(s7V\027(s0S\027(s0B
\027(s8T

Using the above rules to shorten the escape code, you get:

\027&*l*1O\027(0U\027&k2S
\027(s7v0s0b8T

If your escape code doesn't produce the desired effect, check for any lowercase letter L that should be a numeral one and any letter O that should be a zero, and vice versa. The LaserJet ignores any escape codes that it cannot comprehend and doesn't tell you what you've done wrong. Count on some sleuthing if you fail to get the font that you want on the first try.

5. What worksheet settings and escape codes do I specify to print a worksheet?

The table on the right lists *1-2-3* and *Symphony* settings and the escape codes necessary to print the maximum amount of data on one printed page. Also indicated are the print sizes and orientations available via the internal fonts on the LaserJet Plus and Series II.

Remember, if pitch and orientation are not available internally, you'll need to obtain a font cartridge or soft font that offers the print size in the orientation you desire. Also, depending on what fonts are currently available on your LaserJet—that is, internal, soft, and cartridge—you may need to append an extra piece of code to the escape code listed to obtain the exact typeface, style, and so on that you desire. (For more information on this, see "Get the Font You Want" on page 71.)

To obtain the results listed in the table below, you must specify a left, top, and bottom margin of 0 and a right margin as indicated in the table. You also must specify no page breaks or headers or footers.

In *1-2-3* select /Print Printer Options Margins Left and enter 0. Select Margins Top and enter 0. Select Margins Bottom and enter 0. Then select Margins Right and specify the desired margin setting from the table. To cancel page breaks, headers, and footers, select Other Unformatted. Then select Setup and specify the desired code from the table.

In *Symphony* select SERVICES Print Settings Margins No-Margins. This sets the top, bottom, and left margins to 0 and the right margin to 240. Then select Margins Right and specify the desired setting from the table. To cancel page breaks, headers, and footers, select Quit Page Breaks No. Then select Init-String and enter the desired escape code from the table.

One word of advice: To avoid a whole host of problems, *never* adjust the page-length setting except as specified in the table. You can, however, fool with the margin settings and/or specify a header and footer. Here's how.

First, be sure that you have not previously specified Unformatted (in *Symphony*, Page Breaks No). If you're not sure about that, select /Print Printer Options Other Formatted and then select Quit twice. In *Symphony* select SERVICES

PORTRAIT PRINTING

Paper Size/ Lines per Inch	Pitch	Available via Internal Font?		Page Length	Right Margin	Escape Code*
		Plus	Series II			
Letter-size/6 lines per inch	10	Yes	Yes	60	80	\027E
	12	No	No	60	96	\027(s0p12H
	16.6	Yes	Yes	60	132	\027&k2S
Letter-size/8 lines per inch	10	Yes	Yes	80	80	\027&*l*8D
	12	No	No	80	96	\027&k4s\027&*l*8D
	16.6	Yes	Yes	80	132	\027&k2s\027&*l*8D
Legal-size/6 lines per inch**	10	Yes	Yes	78	80	\027&*l*84p2H
	12	No	No	78	96	\027&*l*84p2H\027(s0p12H
	16.6	Yes	Yes	78	132	\027&*l*84p2H\027&k2S
Legal-size/8 lines per inch**	10	Yes	Yes	100	80	\027&*l*84p2h8D
	12	No	No	100	96	\027&*l*84p2h8D\027(s0p12H
	16.6	Yes	Yes	100	132	\027&*l*84p2h8D\027&k2S

LANDSCAPE PRINTING

Paper Size/ Lines per Inch	Pitch	Available via Internal Font?		Page Length	Right Margin	Escape Code*
		Plus	Series II			
Letter-size/6 lines per inch	10	Yes	Yes	45	106	\027&*l*1O
	12	No	No	45	127	\027&*l*1O\027(s0p12H
	16.6	No	Yes	45	176	\027&*l*1O\027&k2S
Letter-size/8 lines per inch	10	Yes	Yes	60	106	\027&*l*1O\027&*l*8D
	12	No	No	60	127	\027&*l*1O\027&k4S\027&*l*8D
	16.6	No	Yes	60	176	\027&*l*1O\027&k2S\027&*l*8D
Legal-size/6 lines per inch**	10	Yes	Yes	45	136	\027&*l*84p2h1O
	12	No	No	45	163	\027&*l*84p2h1O\027(s0p12H
	16.6	No	Yes	45	226	\027&*l*84p2h1O\027&k2S
Legal-size/8 lines per inch**	10	Yes	Yes	60	136	\027&*l*84p2h1o8D
	12	No	No	60	163	\027&*l*84p2h1O\027&k4S\027&*l*8D
	16.6	No	Yes	60	226	\027&*l*84p2h1O\027&k2S\027&*l*8D

* Note that in the escape codes, 1 is a one and *l* is a lowercase letter L, 0 is a zero and O is an uppercase letter O.

** Note that the escape codes assume manual paper feed.

Print and check the setting opposite the word *Breaks*. If Yes is specified, select Quit twice. If No is specified, select Settings Page Breaks Yes and then select Quit twice. Note that Formatted (in *Symphony*, Breaks Yes) is the default.

Let's assume that you're printing six lines per inch. The maximum number of lines you can fit on a page is 60 because the LaserJet reserves one-half inch at the top and bottom for a margin. That reduces the total number of printable inches from 11 to 10, giving you a total of 60 printable lines. If you specify a header and footer, you deduct another six lines, which gives you 54 printable lines. Then suppose you specify a top and bottom margin of 5. You deduct 10 more lines from the 54 to arrive at 44 printable lines.

6. How can I quickly print multiple copies of a spreadsheet or document?

At the Setup (in *Symphony*, Init-String) option on the Print menu, enter an escape code that allows you to select the number of copies to be printed. The correct code to enter is \027&*l*#X, where # represents the number of copies you want to print.

7. Which Symphony *attributes are supported by the LaserJet's internal fonts?*

The following table lists the attributes supported by the internal fonts in the LaserJet Plus and LaserJet Series II.

Attribute	**Plus**	**Series II**
Bold	No	Yes
Italic	No	No
Underlined	Yes	Yes
Superscript	Yes	Yes
Subscript	Yes	Yes
Strike-through	Yes	Yes
Bold Italic	No	No
Bold Italic Underlined	No	No
Italic Underlined	No	No
Bold Superscript	No	Yes
Italic Superscript	No	No
Bold Subscript	No	Yes
Italic Subscript	No	No
Bold Italic Subscript	No	No
Bold Italic Superscript	No	No

8. Why am I having trouble printing graphs?

Two main sources of trouble when printing graphs on a LaserJet are an incorrectly specified orientation and inadequate printer memory.

If you try to print a graph with the LaserJet set for landscape orientation, you'll get either a blank page or a printout of indecipherable characters. The printer will be set for landscape orientation if the previous document was printed that way or, on the Series II, if you've used the control panel to specify a font in landscape orientation.

Before printing a graph, reset the printer to portrait orientation. To do so, press the Hold to Reset key on the LaserJet Plus or the Enter/Reset Menu key on the Series II or turn the printer off and then back on. If you're using a soft font, be aware that turning the printer off will remove the font from memory.

Second, you cannot print out a full-page high-density (300 dots per inch) graph on a LaserJet that has only 512K of internal printer memory. You must purchase additional printer memory or decrease the size or resolution of the graph.

If you use *1-2-3* Release 2.01 or *Symphony* Release 1.2 or 2.0, you can specify both the LaserJet and the LaserJet Plus graphics printer drivers in the Install program. The LaserJet driver allows you to print graphs at 75 dpi, while the LaserJet Plus driver allows you to print graphs at either low density (100 dpi) or high density (300 dpi). By specifying both drivers in the Install program, you can choose from three graphics densities when you print the graph from the PrintGraph program.

9. How can I print a very large worksheet?

To print a large worksheet on a LaserJet Plus, use a font cartridge that supports compressed print in landscape orientation—for example, Hewlett-Packard Font Cartridge G, which offers a compressed Prestige font in landscape orientation. This font, used in conjunction with legal-size paper and an escape code to print 8 lines per inch, fits 60 rows of 226 characters each onto one page. Before entering the escape code, set the left, top, and bottom margins to 0, right margin to 226, and page length to 60. Then select the Unformatted (in *Symphony*, Breaks No) option from the Print menu. The escape code listed below assumes that you'll manually feed the sheet of paper into the printer. If you have a legal-size tray, replace the 2h with 1h.

```
\027&l84p2h1O\027&k2S\027&l8D
```

This code also works on a LaserJet Series II, which has an internal font that prints condensed landscape.

10. How can I use a macro to print out a series of ranges, one to a page?

Suppose your worksheet contains three named ranges: *range1, range2*, and *range3*. Use this *1-2-3* Release 2/2.01 macro to print them out, one to a page:

```
/PPRrange1~AGP
{WAIT @NOW+@TIME(0,0,2)}
Rrange2~GP
{WAIT @NOW+@TIME(0,0,2)}
Rrange3~GP
```

The macro contains several essential {WAIT} statements that give the printer a two-second pause between Print ranges. If you don't include the {WAIT} statements, the printer buffer may overflow, causing the LaserJet to display error code 22. If you use this macro and still receive the error code, increase the wait time from two seconds.

The following is the *Symphony* macro:

```
{SERVICES}PSSRrange1~QAGP
{WAIT @NOW+@TIME(0,0,2)}
SSRrange2~QGP
{WAIT @NOW+@TIME(0,0,2)}
SSRrange3~QGP
```

Still having trouble with your LaserJet? A future article will discuss additional LaserJet tips. Send a complete description of your question or problem to: Phyllis Sharon, LOTUS *Magazine, P.O. Box 9123, Cambridge, MA 02139-9123.*

Phyllis A. Sharon is LOTUS*'s associate editor of features. Scott Love served as technical consultant on this article.*

GET THE FONT YOU WANT

Here's how to crack the codes.

BY PHYLLIS A. SHARON

The appearance of what you print with a Hewlett-Packard LaserJet printer is determined by the font that you select. Eight characteristics, some or all of which you may specify, define that font: orientation, symbol set, spacing, pitch, point, style, stroke weight, and typeface.

Orientation governs the direction of the print on the page. Portrait orientation prints down the length of a page. Landscape orientation prints sideways across the width of a page.

A **symbol set** consists of the available characters in a font. Different sets serve different purposes and contain a variety of characters—for example, mathematical symbols or Greek letters. The set you choose depends on the characters your printed material requires.

Spacing for a font is either fixed or proportional. With fixed spacing, each character uses the same amount of space—for example, the letter I occupies as much space as the letter W. With proportional spacing, some characters occupy more space than others—for example, the letter W takes up more space than the letter I. However, to print a spreadsheet or a document containing columnar data, always select a fixed font. Selecting a proportional font results in data being misaligned on the page.

Pitch refers to the number of characters that occupy a horizontal inch of text. A fixed font prints a uniform number of characters per inch—for example, 10, 12, or 16.6. Pitch does not apply to proportional fonts.

A **point** is a unit of measurement used to determine the height of a character. There are approximately 72 points per inch. Common point sizes are 8.5, 10, 12, and 14.4.

The **style** of the font can be either upright or italic.

Stroke weight governs the thickness of print. The choices are light, medium, and bold.

Typeface refers to the design of the characters. The LaserJet typefaces include the conventional Courier, Times Roman, and Helvetica typefaces.

Specifying a Font

To specify a font on a LaserJet Plus, you use Hewlett-Packard's Printer Command Language (PCL) to construct an escape code that defines a font. If you use a LaserJet Series II, you can use either a PCL escape code or the control panel to specify a font change. Note that in escape codes throughout the text, a lowercase letter L appears in italics (*l*) so as not to be confused with the numeral 1 and a zero appears with a slash (Ø) so as not to be confused with an uppercase letter O.

A different escape code manages each characteristic of a font; therefore, it's your job to construct a description, via escape codes, of the font that you wish to use. The accompanying tables list the escape codes that you will need for font selection, as well as for other miscellaneous printing options.

When you construct an escape code, enter the codes in the following sequence: (1) orientation, (2) symbol set, (3) spacing, (4) pitch, (5) point size, (6) style, (7) stroke weight, and (8) typeface. Once the LaserJet receives the font-selection code, it evaluates all of the available fonts to select the one that best matches your request.

Suppose you want to select a font from Hewlett-Packard Font Cartridge G, which offers a variety of Prestige fonts. The one you want has the following characteristics: landscape orientation, USASCII symbol set, compressed pitch, 7 points, upright, medium weight, Prestige typeface. At the top of the next page are the escape codes, listed in the correct order, that define this particular font.

ESCAPE CODES FOR FONTS*

To select:	Specify code:	Replace # with:
Orientation: Portrait	\Ø27&*l*ØO	
Landscape	\Ø27&*l*1O	
Symbol set	\Ø27(#	Symbol set ID code (for example, ØU for USASCII symbol set, 8U for HP Roman-8 symbol set)
Spacing: Fixed	\Ø27(sØP	
Proportional	\Ø27(s1P	
Pitch: 10	\Ø27&kØS	
12	\Ø27&k4S	
16.6	\Ø27&k2S	
Other	\Ø27(s#H	Number of characters per inch
Point	\Ø27(s#V	Height of characters in points
Style: Upright	\Ø27(sØS	
Italic	\Ø27(s1S	
Stroke weight: Light	\Ø27(s−3B	
Medium	\Ø27(sØB	
Bold	\Ø27(s3B	
Typeface	\Ø27(s#T	Typeface code from printer manual or font cartridge. Common typefaces include: FONT CODE FONT CODE Line Printer Ø Times Roman 5 Courier 3 Letter Gothic 6 Helvetica 4 Prestige 8

*Note that in the escape codes 1 is a one and *l* is a lowercase letter L, Ø is a zero and O is an uppercase letter O.

Characteristic	Your Choice	Escape Code
Orientation	Landscape	\027&*l*1O
Symbol set	USASCII	\027(0U
Pitch	Compressed (16.6)	\027&k2S
Point size	7	\027(s7V
Style	Upright	\027(s0S
Stroke weight	Medium	\027(s0B
Typeface	Prestige	\027(s8T

As with all escape codes, you simply string the pieces together, keeping them in the proper sequence:

\027&*l*1O\027(0U\027&k2S\027(s7V
\027(s0S\027(s0B\027(s8T

As you can see, this is a lengthy escape code. In fact, it exceeds the 39-character maximum that *1-2-3* and *Symphony* accept as an escape code entered at the Setup (in *Symphony*, Init-String) option on the Print menu. Fortunately, you can shorten a long escape code. Question 4 in the article "How to Print Worksheets on a LaserJet" tells you how and uses this example.

You need not specify every characteristic of a font in every escape code. For example, suppose you have available three 12-pitch fonts and want to select the only one that prints 12-pitch italic type in landscape orientation. Your escape code must contain enough information to enable the LaserJet to select that font. You'll want to use the codes for landscape, 12-pitch, and italic-style type. And be sure to place the font-selection escape codes first and in the sequence previously mentioned. Then, if you want to include additional escape codes, such as those for lines per inch or number of printed pages, enter them *after* the font-selection codes.

If you don't get the font you want, make sure you've sent enough information about the desired font to the LaserJet and double-check the sequence of the font-selection codes. Also realize that if you fail to specify an escape code for a font characteristic, the printer assumes that you want to use what was last specified. For example, if the last document printed was in a 10-pitch font and you don't specify the pitch in the current font escape code, the printer assumes that you still want a 10-pitch font.

If you use a LaserJet Series II, you can use the printer's control panel to specify your font selection. Here's how:

1. Take the printer off-line.

2. Specify the desired symbol set. Hold the Menu key down for several seconds. The message *SYM SET=* followed by the current symbol set appears. Press the + or − key until the name of your desired symbol set appears on the display. Press the Enter/Reset Menu key to save your selection. An asterisk will appear in the display. Press the Continue/Reset key for several seconds until the message 07 *Reset* appears.

3. Obtain a sample font printout by taking the printer off-line and pressing the Print Fonts key. The display will show *06 FONT PRINTOUT*. The printed sample shows every font currently available in each orientation. The first column of the printout contains a three-character code that identifies each font. The font ID indicates the source and number of the font. The four possible sources are I for an internal font, L for a font in the left font cartridge, R for a font in the right font cartridge, and S for a permanent soft font. The LaserJet assigns ID codes according to which fonts and symbol sets are currently available. So be aware that a font now code-numbered L04 may later be assigned a different font number.

GENERAL ESCAPE CODES*

To select:	Specify code:	Replace # with:
Number of copies	\027&*l*#X	Desired number of copies
Lines per inch: 6 lpi	\027&*l*6D	
8 lpi	\027&*l*8D	
Page length	\027&*l*#P	Length of page in lines
Letter-size paper**	\027&*l*2A	
Legal-size paper**	\027&*l*3A	
Underline on	\027&dD	
Underline off	\027&d@	
Tray feed	\027&*l*1H	
Manual feed	\027&*l*2H	
Master reset	\027E	

*Note that in the escape codes, 1 is a one and *l* is a lowercase letter L, 0 is a zero and O is an uppercase letter O.

**Escape code available only for LaserJet Series II

4. Once you've selected the font ID number, take the printer off-line. Press the Menu key three times. The message *FONT SOURCE* = followed by the current font source appears. Press the + or − key until the font source code of your desired font appears. Press the Enter/Reset Menu key to save your selection. An asterisk appears in the display. Press the Menu key. The message *FONT NUMBER* = followed by the current font number appears. Press the + or − key until the font number you want appears. Press the Enter/Reset Menu key to save your selection. An asterisk appears in the display. Press the Menu key twice to display 00 *Ready*. Hold the Continue/Reset key for several seconds until the message 07 *Reset* appears. The printer will go on-line, and 00 *Ready* will appear.

What's the Default Font?

You're probably accustomed to working with default settings. After all, *1-2-3* and *Symphony* contain dozens of defaults that govern everything from column width to recalculation mode. The reassuring fact is that the defaults are always the same unless you choose to change them permanently.

It would be nice if the LaserJet operated that simply when choosing a default font, but it doesn't. Both the LaserJet Plus and the Series II have a prioritization scheme for selecting a default font. And the default changes, depending on the combination of fonts currently available.

The order of priority for default fonts is: (1) a font you specify with an escape code, which will be in effect until you reset the printer by sending the master reset code, \027E (on a Series II you can also use the Reset key on the control panel), (2) on a Series II, a font you specify by using the control panel's print menu, (3) a default font contained in an installed font cartridge, which is noted on the font cartridge, (4) the internal factory default font, which is portrait, Roman-8, 10 pitch, 12 point, upright, medium weight, Courier typeface. ■

Phyllis A. Sharon is LOTUS*'s associate editor of features.*

SOME ESSENTIAL PRINTER UTILITIES

Remedies for printing-related maladies

BY MARC DAVIDSON AND
MIKE PANDOLFO

Does printing frustrate you? What follows is a sampling of printer utilities—programs that help you get the best performance from your current printer.

Menu-Driven Printer Control

If you use *1-2-3* Release 2/2.01 or any release of *Symphony*, you can enter directly into your worksheet setup strings (which in *Symphony* are called initialization strings) to change the type size, the line width, or the number of characters per line anywhere within a document. Unfortunately, the setup strings differ from printer to printer and are often poorly documented in the printer's manual.

Several printer utilities let you issue those commands simply by choosing options from menus. Two good examples in this category are *JetSet* and *Printworks*. The add-in *JetSet* works exclusively with Hewlett-Packard (HP) laser printers and compatibles. *Printworks* comes in versions for laser printers and dot-matrix printers. The dot-matrix version also lets you print worksheets sideways and design custom fonts. The laser version supports HP and Canon laser printers, among others.

•*JetSet* Version 1.2. Intex Solutions, 161 Highland Ave., Needham, MA 02194; 617-449-6222. Runs on the IBM PC, PC XT, PC AT, PS/2, and compatible computers. Requires DOS 2.0 or higher, *1-2-3* Release 2/2.01 or any version of *Symphony*, 64K of RAM, and an HP laser printer or compatible. Released 6/87. $95. 30-day money-back guarantee.

•*Printworks* (PC/Laser Version) Version 2.12. Phoenix Technologies, 6600 Kalanianaole Hwy., Honolulu, HI 96825; 808-396-6368. Runs on the IBM PC, PC XT, PC AT, PS/2, and compatible computers. Requires 256K of RAM and DOS 2.0 or higher. Released 10/87. $125. *Printworks* (PC/Dot-Matrix Version) Version 1.05. Requires 256K of RAM and DOS 2.0 or higher. Released 3/86. $75. 90-day exchange policy.

Enhancing Text

Text enhancers let you add desktop publishing-like print enhancements, such as boldface and underlines, to your spreadsheet. Some also allow you to add special effects. For example, *Allways*, an add-in for *1-2-3*, lets you include gray shading and grids in your spreadsheet, as well as use as many fonts as you have in your printer. *Allways* also lets you print graphs and your spreadsheet on the same page.

Impress accomplishes the same feats as *Allways*, but goes one step further. You can edit your worksheet while using *Impress*. If you need to edit your data while using *Allways*, you have to switch back to *1-2-3*. *Impress* also uses *1-2-3*'s printer drivers, so if your printer works with *1-2-3*, it will probably work with *Impress*.

If you use software fonts with your HP laser printer, *Font Effects* lets you vary these fonts to include outlining and shadowing. *Lines, Boxes, Etc.* allows you to print negative numbers with gray shading or colors (if you have a color printer) and lets you outline a range of cells.

•*Allways* Version 1.0. Funk Software, 222 Third St., Cambridge, MA 02142; 800-822-3865 or 617-497-6339. Runs on the IBM PC, PC XT, PC AT, PS/2, and compatible computers. Requires DOS 2.0 or higher, *1-2-3* Release 2/2.01, and 128K of RAM. Works with the HP LaserJet, HP LaserJet Series II, HP DeskJet, and HP PaintJet; Apple LaserWriter NT and NTX and other PostScript printers; and various dot-matrix printers. Released 11/88. $149.95. 30-day money-back guarantee.

•*Impress*. PC Publishing, 1801 Avenue of the Stars, Los Angeles, CA 90067; 213-556-3630. Runs on the IBM PC, PC XT, PC AT, PS/2, and compatible computers. Requires DOS 2.0 or higher, 100K of RAM, *1-2-3* Release 2/2.01, and a graphics card (CGA, EGA, VGA, or Hercules). Uses *1-2-3*'s printer drivers. Released 1/89. $139. 30-day, money-back guarantee.

•*Font Effects* Version 1.1. SoftCraft, 16 North Carroll St., Suite 500, Madison, WI 53703; 800-351-0500 or 608-257-3300. Runs on the IBM PC, PC XT, PC AT, PS/2, and compatible computers. Requires DOS 2.0 or higher, 320K of RAM, and an HP laser printer or compatible. Prints files created with *1-2-3* Release 1A and 2/2.01. Released 2/87. $95. 60-day warranty against defects.

•*Lines, Boxes, Etc.* Version 1.1. M.A.P. Systems, 1120 NASA Rd. One, Suite 320, Houston, TX 77058; 800-527-2851 or 713-333-9640. Runs on the IBM PC, PC XT, PC AT, PS/2, and compatible computers. Requires DOS 2.0 or higher, 30K of RAM (70K for Extended Edition), and a 9-pin or 24-pin dot-matrix printer. Released 3/88. Regular Edition, $49.95; Extended Edition (with more characters), $89.95. Each edition available in versions for 9-pin or 24-pin dot-matrix printers. 30-day money-back warranty.

Using Special Fonts

Font-control utilities make it easier for you to select fonts from your laser printer. Some also enable you to design your own fonts, which you might want to do to improve the legibility of your printouts and give them extra impact. Many font-creation utilities come with a starter set of fonts.

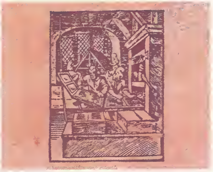
Fontastic, a font-control utility, lets you shade areas of your worksheet and merge graphics with text. *Fancy Font*, a font-creation utility, can help you create letter-quality fonts for your dot-matrix printer.

If you have a laser printer, you can add fonts by buying more font cartridges. There are now at least two cartridges designed specifically for spreadsheet users. *JetFont 12/30* (formerly *JetFont 12/3*) and *Spreadsheet*, special font cartridges for laser printers, provide small fonts to let you print your widest spreadsheets on a single page. With the smallest font, which prints 30 characters per inch, you can print 240 characters across a vertically aligned, 8½-inch by 11-inch piece of paper. You can also control these fonts to yield as many as 16 lines of text per inch.

- *Fancy Font* Version 3.0. SoftCraft, 16 North Carroll St., Suite 500, Madison, WI 53703; 800-351-0500 or 608-257-3300. Runs on the IBM PC, PC XT, PC AT, PS/2, and compatible computers. Requires DOS 2.0 or higher and 256K of RAM. Works with Epson MX, FX, or LQ dot-matrix printers; Toshiba laser printers; and HP laser printers. Prints files created with *1-2-3* Release 1A and 2/2.01. Released 5/87. $180. 60-day warranty against defects.
- *Fontastic* Version 2.0. Koch Software Industries, 11 West College Dr., Bldg. G, Arlington Heights, IL 60004; 800-634-5624 or 312-398-5440. Runs on the IBM PC, PC XT, PC AT, PS/2, and compatible computers. Requires DOS 2.0 or higher and 30K of RAM. Works with HP LaserJet, Canon, and Ricoh laser printers; Xerox 4045/2700 Mode, and the NCR 6416 laser printer. Released 11/86. $120. 30-day money-back guarantee.
- *JetFont 12/30*. Computer Peripherals, 667 Rancho Conejo Blvd., Newbury Park, CA 91320; 800-854-7600 or 805-499-5751. Requires an HP LaserJet or a Canon laser printer. $325. Two-year parts-and-labor warranty.
- *Spreadsheet*. Pacific Data Products, 6404 Nancy Ridge Dr., San Diego CA 92121; 619-552-0880. Requires an HP LaserJet, Canon, or Olivetti laser printer. $195. Lifetime-replacement warranty.

Printing in the Background

If you use a print spooler program, you can give the command to print a file and then immediately return to your program—or work with another program—while the printer prints that file. One such program, *Duet*, is in a class by itself. In addition to letting you print in the background, it lets you suspend or cancel print jobs, move their position in the print queue, dictate the number of copies of each job to print, and delay print jobs until a specified time. The program also distinguishes itself as one of the most multifaceted of any printer utility. It lets you print sideways and control your printer's fonts and attributes.



- *Duet* Version 1.14. Consumers Software, 736 Chestnut St., Santa Cruz, CA 95060; 408-426-7311. Runs on the IBM PC, PC XT, PC AT, PS/2, and compatible computers. Requires DOS 2.0 or higher and 70K of RAM. Released 12/88. $89.95. 60-day money-back guarantee.

Emulating Other Printers

Emulation programs let one printer emulate—or respond to the same commands as—another printer. This is essential if you have a program that works with a limited number of printers and the printer you have is not one of them. For example, if you have a laser printer but your software program works only with dot-matrix printers, an emulation program will let you control the laser printer using the drivers and commands of the dot-matrix printer.

PC Em-U-Print emulates IBM PC graphics printers on Hewlett-Packard, Canon, Xerox, Ricoh, and NCR laser printers, as well as on the HP DeskJet printer. If you have an HP LaserJet, *LaserControl* will let you emulate Qume, Diablo and NEC daisy-wheel printers, as well as a number of dot-matrix printers.

- *LaserControl* Version 3.3. Insight Development Corp., 1024 Country Club Dr., Suite 140, Moraga, CA 94556; 415-376-9451. Runs on the IBM PC, PC XT, PC AT, PS/2, and compatible computers. Requires DOS 2.0 or higher, 60K of RAM, and an HP laser printer or compatible. Released 11/88. $149. 30-day money-back guarantee.
- *PC Em-U-Print* Version 2.0C. Koch Software Industries, 11 West College Dr., Bldg. G, Arlington Heights, IL 60004; 800-634-5624 or 312-398-5440. Runs on the IBM PC, PC XT, PC AT, PS/2, and compatible computers. Requires DOS 2.0 or higher and 10K of RAM. Released 1/88. $95. 30-day money-back guarantee.

Printing Sideways

If you print wide spreadsheets on a dot-matrix printer, *1-2-3* and *Symphony* offer no choice beyond printing one page width at a time and taping the pages together. Utilities that allow sideways printing rotate the text 90 degrees and print it along the horizontal axis of the paper. If you use tractor-fed paper, you can continuously print a spreadsheet of any width, without having to tape pages together.

Sideways, the best-known of these utilities, includes both an add-in for *1-2-3* Release 2/2.01 and *Symphony*, and a stand-alone program that works with *1-2-3* Release 1A or any ASCII file. As mentioned previously, *Duet* also lets you print sideways, and it lets you resume working on your computer while your printer is printing (see the Printing in the Background section).

- *Sideways* Version 3.21. Funk Software, 222 Third St., Cambridge MA, 02142; 800-822-3865 or 617-497-6339. Runs on the IBM PC, PC XT, PC AT, PS/2, and compatible computers. Requires DOS 2.0 or higher and 80K of RAM; requires an additional 20K of RAM when used as an add-in with *1-2-3* Release 2/2.01. Released 7/87. $69.95. 30-day money-back guarantee. ■

Marc Davidson is a free-lance writer and a frequent contributor to LOTUS. *Mike Pandolfo is a computer instructor specializing in applications development.*

CHRIS McALLISTER

DESIGN SPREADSHEET REPORTS WITH ALLWAYS

How to make professional-quality documents

Allways, the Spreadsheet Publisher, is that and more. As the illustrations on these pages make clear, *Allways* lets you transform lackluster spreadsheets into annual-report-quality documents. In the following tutorial, you'll use this *1-2-3* add-in to create a report that incorporates features such as underlining, shading, special fonts, and embedded graphs. The commands you learn here are ones you can generalize to other kinds of reports and to custom forms.

Allways works equally well with a dot-matrix printer and a laser printer. However, if you have a Hewlett-Packard LaserJet, you'll need to have 512K of RAM installed. The HP LaserJet Plus, HP LaserJet Series II, and dot-matrix printers need no additional memory. *Allways* also works with ink-jet printers, but not with daisy-wheel printers or plotters.

To begin the tutorial, install *Allways* according to the instructions in the *Allways* manual, and load *1-2-3*. Then follow the instructions in the "How to Set Up the Worksheet" box to build the model shown in figure 1. Save the worksheet by selecting /File Save and entering the file name REPORT.

Once you've built and saved the model, select Alt-F7 or Alt plus whatever key you designate during the install process as the "hot key" used to invoke *Allways*. In a moment you'll see the *Allways* display of your worksheet. If you work on a system that cannot display graphics, you can see your worksheet only in Text mode. Although you won't be able to see on your screen the attributes you apply in the following steps, you'll be able to view the status box to check on the type specifications and design elements you designate for your document. Your printed report will be identical to the report developed on a system that can display graphics.

Program Scope

Press the slash key to view the *Allways* main menu. To get a sense of the scope of the program, move the menu pointer to each command, press Return to read the next level of menu items, and press Escape or the slash key to return to the main menu.

The *Allways* main menu offers you the following commands:

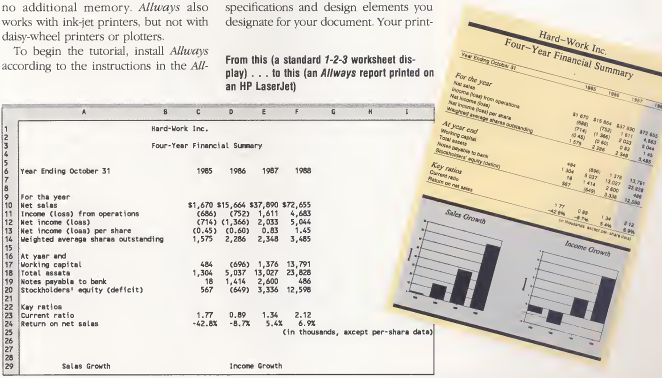
Worksheet lets you insert and delete horizontal and vertical page breaks and change the size of individual columns and rows.

Format is a toolkit that lets you specify fonts for drawing lines and specify attributes such as boldface, underline, shades, and colors.

Graph lets you import PIC files, size them, and use the commands available in Lotus's PrintGraph program to control how the PIC files print. PIC files store Lotus graphs.

Layout lets you control page size and

From this (a standard *1-2-3* worksheet display) . . . to this (an *Allways* report printed on an HP LaserJet)



```
           A                    B       C       D       E       F       G       H       I
1                         Hard-Work Inc.
2
3                         Four-Year Financial Summary
4
5
6  Year Ending October 31              1985    1986    1987    1988
7
8
9  For the year
10 Net sales                         $1,670 $15,664 $37,890 $72,655
11 Income (loss) from operations      (686)   (752)  1,611   4,683
12 Net income (loss)                  (714) (1,366)  2,033   5,044
13 Net income (loss) per share       (0.45)  (0.60)   0.83    1.45
14 Weighted average shares outstanding 1,575  2,286  2,348   3,485
15
16 At year end
17 Working capital                      484   (696)  1,376  13,791
18 Total assets                       1,304   5,037 13,027  23,828
19 Notes payable to bank                 18   1,414  2,600     486
20 Stockholders' equity (deficit)       567   (649)  3,336  12,598
21
22 Key ratios
23 Current ratio                       1.77    0.89    1.34    2.12
24 Return on net sales               -42.8%   -8.7%    5.4%    6.9%
25                                             (in thousands, except per-share data)
26
27
28
29         Sales Growth                     Income Growth
```

gives you the choice of having your worksheet print out on a grid. It also lets you maintain libraries of print settings. Note, however, that unlike *1-2-3*, *Allways* measures margins in inches, not in lines or characters.

Print lets you print a report, make a print file, or change your hardware specification. It also includes commands to number pages, to specify the number of copies to print, and to pause for paper changes.

Display lets you select Graphics- or Text-mode worksheet display, change the scope of the displayed portion of the worksheet, suppress the display of graphs, and set your screen colors.

Special gives you a group of shortcuts for copying and moving formats from one range to another and for importing formats from another file. It also lets you use the Justify command, similar to *1-2-3*'s Range Justify command, to rejustify text. The changes you make with *Allways* do not affect the data on the underlying worksheet. If you use the *Allways* Justify command, you'll preserve the current appearance of the worksheet, even though the *Allways* screen will show the affected text rejustified.

When you finish, press Escape to cancel the menu.

There is no Save command in *Allways*. To save your work in *Allways*, return to the *1-2-3* display either by pressing Escape and choosing 123 from the *Allways* menu or by pressing Alt-F7, and save the worksheet with the File Save command. *Allways* will write a file with the same name as your worksheet plus the extension ALL. In this case, the *Allways* file is named REPORT.ALL.

HOW TO SET UP THE WORKSHEET IN 1-2-3

1. Default settings

Format: General
Select /Worksheet Global Format General

Column width: 8
Select /Worksheet Global Column Width, enter 8

2. Individual column widths

Column	width
A	32

To set the width of column A, place the cell pointer in column A, select /Worksheet Column Set-Width, enter 32

3. Cell formats

Format	Range
Currency 0	C10..F10
Comma 0	C11..F20
Comma 2	C13..F13
Comma 0	C14..F20
Fixed 2	C23..F23
Percent 1	C24..F24

For example, to set the format for range C10..F10, select /Range Format Currency, enter 0, specify range C10..F10

4. Labels

Enter all labels shown in figure 1 as left-aligned with these exceptions: Center the labels in cells B1, B3, and A29; right-align the label in cell F25. Enter three blank spaces in front of the left-aligned label in cell D29.

To enter a centered label, type ^ before the label. To enter a right-aligned label, type " before the label.

5. Values

Enter all values shown in figure 1.

6. Graphs

Select /Graph Type Bar X, enter C6..F6, select A, enter C12..F12, select Options Grid Horizontal Color Quit View, press any key to return to the worksheet display, select Save, enter *Income*. With the menu still in the control panel, select A, press Backspace to clear the current range, enter C10..F10, select View, press any key to return to the worksheet display, select Save, enter *Sales*, select Quit.

Note: If your display doesn't show graphs, you can still define and print them. However, omit the View command and the "press any key to return to the worksheet display" instruction in each instance where they appear.

Formatting the Report

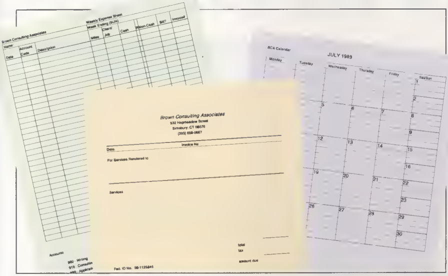
Your first step is to change the font used in the title of your report. With the cell pointer in cell B1, select /Format Font, from the pop-up menu select 8 (Times 20 point), specify range B1..B3, and press Return. Note that the labels in cells B1 and B3 are now centered across the page, not just across column B.

Now add several solid lines. Select /Format Shade Solid and indicate range A2..F2. Reduce the size of that line by selecting /Worksheet Row Set-Height and entering 8. Move the cell pointer to cell A6. Before selecting a command in *Allways*, you can indicate the range it should apply to. When you do that, the range specification remains in effect to indicate the scope for subsequent commands. Your next step is to place a line at the top and at the bottom of row 6. Since both commands act on the same range in row 6, select range A6..F6 first, then issue each of the two commands needed to finish the task. To begin, press the period key to anchor the cell pointer and note the ANC indicator at the bottom of your screen. Select /Format Lines Top. Next, select /Format Lines Bottom.

Each of the three groups of labels in column A has at its head a title that you'll format in a slightly larger, italic font. Move to the topmost of those labels, in cell A9. You'll use Times Italic 14 point, a font that doesn't appear on the default font menu. To use it, replace one of the fonts on the menu with the new font. Select /Format Font 6 (Times Italic) Replace, select 7 (Times Italic), select 14 Use, and press Return to format the current cell. Move to cell A16 and select /Format Font 6 (now Times Italic 14 point), then press Return to format the current cell. Move the cell pointer to cell A22 and repeat those steps.

To further differentiate the three segments, place solid lines between them. Move the cell pointer to cell A15. Select /Format Lines Top and specify range A15..F15. Repeat those steps for ranges A21..F21 and A25..F25, respectively.

Move the cell pointer to cell F24, at the bottom of the column of figures reflecting the most recent year's data. Highlight



Although *Allways* is designed to enhance your reports, you can use it to design and print virtually any kind of business form.

that data by shading it. Press the period key to anchor the cell pointer, move the pointer to cell F6, and press Alt-S. Alt-S, a so-called quick key, selects the commands to shade a range of the worksheet. You could select those commands from the /Format Shade menu, but Alt-S uses fewer keystrokes. Note that if you repeatedly press Alt-S, you'll cycle through each of the related menu selections: Light, Dark, Solid, no shading (here *Allways*' menu does not display an option), and back to Light again. Refer to page 32 in the *Allways* manual for a list of 12 other quick keys.

Move the cell pointer to cell F25 to reduce the size of the footnote stored there. Select /Format Font 3 (Triumvirate 14 points) Replace 8 (Triumvirate) 8 points, Use, and press Return.

Embedding Graphs

The area at the bottom of the report will contain two graphs, the titles of which are the labels *Sales Growth* and *Income Growth*. First, you'll set off that area with two filled-in lines and then shade it. Move the cell pointer to cell A27, and press the period key and the DownArrow key once to select a range. Select /Worksheet Row Set-Height, and enter 6. Press Escape to cancel the selection, press the period key, and highlight range A27..F27. Press Alt-S three times to fill in the row with a solid line.

Move the cell pointer to cell A45, and with one exception, repeat the procedure to change the row height and make a solid line from cell A45 through cell F45. The exception: Anchor the pointer and press UpArrow once instead of pressing DownArrow once. To shade the range between the two borders you've just created, move the cell pointer to cell A29, press the period key, highlight range A29..F43, and press Alt-S once to cover that range with a light shade.

Allways can import the graphs you saved earlier in *1-2-3*. After you import them, *Allways* will reread the PIC files each time you print your report. If you've updated and resaved those graphs in *1-2-3*, the *Allways* report will reflect those changes. Move the cell pointer to cell A30. Select /Graph Add, select the graph file named SALES.PIC, indicate range A30..A43, and select Quit. On a system that can display graphs, you'll see the graph in your report. To add the second graph, move the cell pointer to cell C30, select /Graph Add, select the graph file INCOME.PIC, indicate range C30..F43, and select Quit.

With both graphs in the report, you now have only to format their titles, save your work, and print the report. To format the titles, place the cell pointer on cell A29, select /Format Font 6 (Times Italic 14 point) Use, then indicate range A29..F29 and press Return. Before printing, save your work by pressing Alt-F7 to return to *1-2-3* and selecting /File Save Replace, press Return, and select Replace. Press Alt-F7 to return to *Allways*, check your printer to make sure it is ready, select /Print Range Set, indicate range A1..F45, and select Go. The status indicator in the left corner of row 2 on your screen tells you which row is printing. *Allways* will take a while to print the report, and you can use this indicator to keep apprised of its progress.

Finally, if you're working on a color monitor or printing on a color printer, you might like to use an option that shows all negative numbers in red. Move the cell pointer to cell A1, select /Format Color Red-on-neg. Press End Home and then Return to highlight the entire report.

You'll be able to use these skills to create a variety of high-quality reports and business forms. As you do, try using the Help key (F1) to explore some of the other report-formatting options the program offers. Finally, be sure to save your *1-2-3* worksheet after creating a new *Allways* report, because even if you saved the worksheet before creating the report, you must resave it in order to save the *Allways* report. ■

Prepared by the LOTUS *staff.*

IN BRIEF

Allways, Version 1.0. Funk Software, 222 Third St., Cambridge, MA 02142; 617-497-6339. Requires MS-DOS 2.0 or higher and *1-2-3* Release 2/2.01. Works with CGA, EGA, VGA, and Hercules display adapters, most popular dot-matrix printers, the HP LaserJet Series II and HP LaserJet Plus, and PostScript devices. Requires approximately 128K of RAM above that used by *1-2-3*. Also supports EMS. While supplies last at participating dealers, free with purchase of *1-2-3* Release 2.01. Released 10/88. $149.95; unconditional 30-day, money-back guarantee if purchased through Funk Software.

This is abou

At this moment, millions of Lotus® 1-2-3® users are faithfully awaiting the arrival of a product called Release 3. A character-based product that promises greater power and greater productivity for serious spreadsheet users.

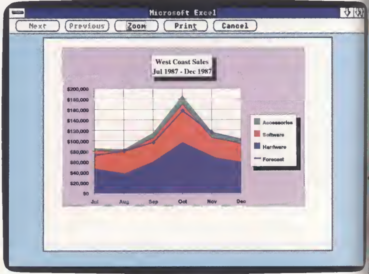
Microsoft Excel. Or, how to see Lotus 1-2-3 Release 3 from a whole new perspective.

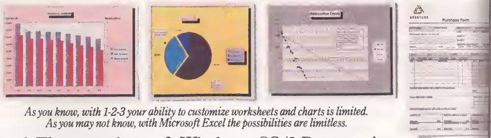
As soon as it gets here.

In the meantime, we have a question: If Release 3 is in fact character-based, and the entire personal computing industry continues moving toward *graphics*-based environments, is it wise to wait for Release 3? Or consider the alternative.

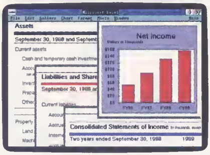
Actually, you can do both. Because you have nothing to lose by seeing the other side of the spreadsheet story, and trying it for yourself.

It's called Microsoft® Excel. The spreadsheet specifically designed for graphic environments—the industry's emerging standard. Five minutes in front of a demo will show you the fastest, easiest, most enjoyable way to crunch your numbers. Thanks to an incredibly intuitive design that exploits innovations like Microsoft Windows, OS/2 Presentation Manager and, of course, the Macintosh.®





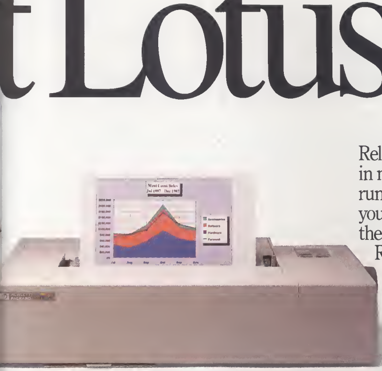
As you know, with 1-2-3 your ability to customize worksheets and charts is limited. As you may not know, with Microsoft Excel the possibilities are limitless.



Unfortunately, 1-2-3 won't let you move, size, and link an unlimited number of files at the same time. Fortunately, Microsoft Excel will.

You're a loyal Lotus user. If you're a bit skeptical, we fully understand that. We also anticipated it. So we've made sure your hard-earned equity in 1-2-3 is not obsolete. In fact, we've not only made a transition to Microsoft Excel attractive, we've also made it easy: Microsoft Excel actually reads and writes

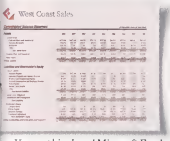
t Lotus 1-2-3.



No more wasted trips to the printer. Microsoft Excel comes with Print Preview for true WYSIWYG. Unlike Release 3.

1-2-3 files and even helps translate macros. It also offers the convenience of 1-2-3 on-line help—so you can expect a surprisingly smooth transition. In fact, the slash key you punch to access your 1-2-3 commands is the same key that can access Microsoft Excel commands—you don't have to relearn a thing.

Another issue: hardware.



West Coast Sales

Consolidated Balance Sheet

Assets

Liabilities and Stockholder's Equity

Yes, graphics-based Microsoft Excel was designed around a mouse. You can also use it without one.

As Lotus may or may not have told you, Release 3 will need a substantial investment in new hardware. The same hardware that runs Microsoft Excel. All we're saying is, if you're committing to new machines, make the most of those new machines. Something Release 3 simply won't.

But, using is believing. So we've made it convenient to get a sample of Microsoft Excel in your hands. Simply call us at (800) 541-1261, Dept. J16 for a free sample disk of your own. It's worth the call. It's worth the experience.

For even more convincing, call for a sample disk. The disk is free. But the experience is priceless.

In fact, we're so confident about Microsoft Excel that we're offering a no-questions-asked, money-back guarantee good through January 1990. Which means we're actually willing to guarantee our current technology against Lotus technology that isn't even available yet.

All of which brings us to a decision millions of you are about to face:

Upgrade to character-based Release 3, or upgrade to the power and simplicity of a graphics-based spreadsheet. We're not saying it's an easy decision.

Just an inevitable one.

Microsoft®
Making it all make sense.™

Money-back guarantee valid only if purchased after May 1, 1988. Customers in Canada, call (416) 673-7638. Outside North America, call (206) 882-8661. © Copyright 1989 Microsoft Corporation. All rights reserved. Microsoft and the Microsoft logo are registered trademarks and Making it all make sense is a trademark of Microsoft Corporation. Lotus and 1-2-3 are registered trademarks of Lotus Development Corporation. Macintosh is a registered trademark of Apple Computer, Inc.

Q&A

ANSWERS TO YOUR QUESTIONS ABOUT LOTUS PRODUCTS

SYMPHONY

DOC AS THE DEFAULT WINDOW TYPE

Q. I work in a *Symphony* DOC window more often than a SHEET window. Can I write a macro that will bring me into a blank DOC window each time I begin a *Symphony* work session?

Sandra Crew
St. Joseph's College
Philadelphia, Pa.

A. You don't need a macro. You can specify DOC as the default window type in the Configuration settings sheet if you press SERVICES and select Configuration Window Type DOC Update Quit. Select Update from the Configuration menu to save the settings to a file so that *Symphony* can find them at the beginning of future work sessions.

INSERTING PHONE NUMBER HYPHENS IN FORM

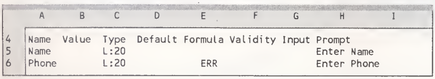
Q. How can I get *Symphony* to insert hyphens in phone numbers as I enter them into a FORM window?

Kelsey L Scott
Fairbanks, Alaska

A. In a SHEET window, find the row in the Definition range that defines the phone number field. Then position the cell pointer in the formula column of that row. In our example, the cell pointer will be in cell E6. Enter the following formula—never mind that it returns ERR:

@LEFT(G6,3)&"–"&@MID(G6,3,3)
&"–"&@RIGHT(G6,4)

In your worksheet, replace all references to cell G6 with references to the corresponding cell of your Definition range's Input column. When you return to a FORM window, *Symphony* will automatically insert a hyphen into each phone number as you enter it.



	A	B	C	D	E	F	G	H	I
4	Name	Value	Type	Default	Formula	Validity	Input	Prompt	
5	Name		L:20					Enter Name	
6	Phone		L:20		ERR			Enter Phone	

1-2-3

JAPANESE AND AMERICAN VERSIONS OF 1-2-3

Q. We have sales offices in Boston and Japan and need to know if worksheets created in *1-2-3* are compatible with the Japanese version of *1-2-3*, Releases 2.0J and 2.1J.

C. F Gail
Boston, Mass

A. You don't need to translate files created in *1-2-3* (WKS or WK1) in order to use them in *1-2-3* Release J. You must, however, translate files created in *1-2-3* Release J (WJ1) into the *1-2-3* WKS or WK1 format. Use the Translate utility found in *1-2-3* Release J. If you use *Symphony*, retrieve WJ1 files after you translate them into the WKS or WK1 format.

GARBAGE IN OUTPUT RANGE AFTER DATA PARSE

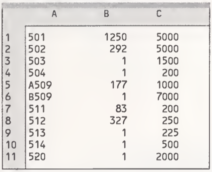
Q. After downloading data from our mainframe into *1-2-3*, I use the Data Parse command to separate the long labels into columns. Most of the time the process runs smoothly, but sometimes I get unexpected results in the Output range. Garbage characters arise in the parsed data or the data itself comes out scrambled. What's happening?

Kathryn Shubert
Tile City
Birmingham, Ala

A. We couldn't consistently reproduce your problem. However, you may get unexpected results if your Output range overlaps the data you are parsing. When specifying the Output range, be sure to identify an area separate from the range of data to be parsed.

VIEWING GRAPHS

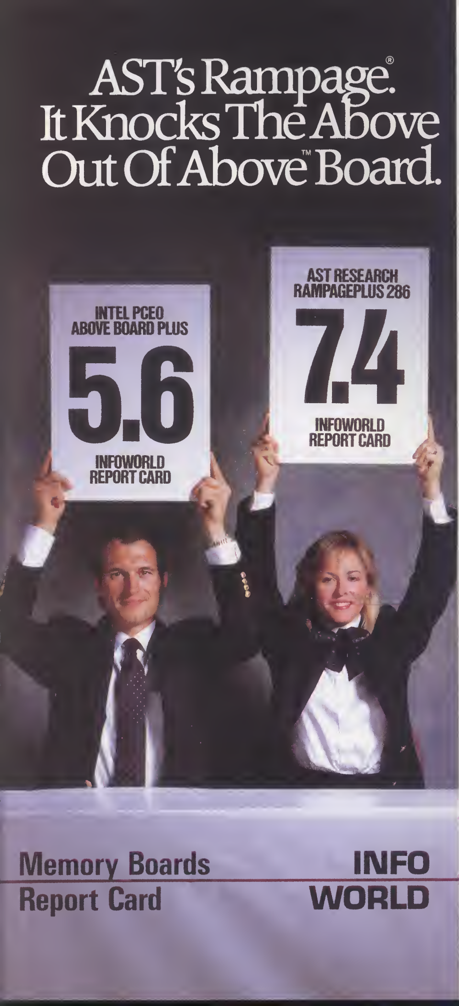
Q. I'm having difficulty viewing a graph in *1-2-3* Release 2.01. I enter the data shown below and then select /Graph Type Bar. I specify range A1..A11 as the X range, range B1..B11 as the A range, and range C1..C11 as the B range. When I select View, the computer beeps and the spreadsheet remains on the screen.



	A	B	C
1	501	1250	5000
2	502	292	5000
3	503	1	1500
4	504	1	200
5	A509	177	1000
6	B509	1	7000
7	511	83	200
8	512	327	250
9	513	1	225
10	514	1	500
11	520	1	2000

I know my computer has a graphics card because I create and view graphs with other programs. I used to be able to view graphs in *1-2-3*, but I had a problem printing them, so I went through the Install program to change the printer driver. Now I can print a graph, but I can't view it. Can you help?

B P Ragsdale
Whittier, Calif



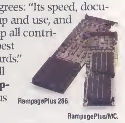
AST's RampagePlus 286 not only knocks the above out of Intel®'s Above Board Plus, according to InfoWorld's December 12, 1988 issue, it stands alone as "this product category's technology leader."

InfoWorld Report Card Memory Boards	AST Research RampagePlus 286	Intel PCEO Above Board Plus
Performance		
EMS 4.0 capabilities	Excellent	Satisfactory
Software compatibility	Good	Good
Hardware compatibility	Good	Good
Speed: large applications	Good	Good
Speed, multitasking	Excellent	Satisfactory
Expandability	Very Good	Satisfactory
Documentation	Very Good	Good
Setup	Good	Satisfactory
Ease of use	Good	Satisfactory
Serviceability		
Workmanship	Very Good	Satisfactory
Support policies	Good	Excellent
Technical support	Good	Good
Value	Very Good	Satisfactory
Final scores	7.4	5.6

Source: InfoWorld December 12, 1988

RampagePlus 286 for your IBM® PS/2® 30 286, AT® or compatible, or RampagePlus/MC for your IBM PS/2 50, 50Z or 60, offer up to 8 MB of expanded memory, OS/2™ compatibility and optional I/O piggyback modules. And most important, full EMS 4.0 support—in fact, InfoWorld says RampagePlus 286 "supports EMS 4.0 better than any other board tested."

Receiving high marks isn't new to us. We've sold more memory/multifunction boards than any other company. Award-winning boards, like SixPakPlus® and Advantage.® We're proud to say the RampagePlus boards are our best ever. Obviously InfoWorld agrees: "Its speed, documentation, ease of setup and use, and quality of workmanship all contribute to making it the best value among these boards."



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Times Have Changed.

A. You may have accidentally deleted the driver for the graphics card when you changed your printer driver. Use the Install program again to install the graphics card driver. Before you begin, determine what type of graphics card you have in your computer.

To start the Install program, select Install from the Access menu, or enter *install* at the *1-2-3* subdirectory DOS prompt. Follow the instructions on the screen. When the main menu appears, press the F10 key. The screen will display the current selections in your driver set. If the Text Display lists Universal Text Display, and the Graph Display lists None, the driver set has no graphics card driver. Press the Escape key to return to the main menu. Select Change Selected Equipment, then select Screen Display. Follow the menu prompts to install the graphics card driver. Remember to save the driver set before you exit from Install.

1-2-3/SYMPHONY

RE-CREATING RANGES

Q. I use the Range Name Table command to list the range names and corresponding cell addresses in one of my *1-2-3* worksheets. I want to assign these range names to ranges in other worksheets. I use the File Combine command to bring the table of range names and addresses into another worksheet. If I change the addresses in the table to reflect the ranges I want to name in the current worksheet, is there an easy way to assign the range names?

Donald F. Elsmore
Burbank, Calif.

A. Use a simple macro to assign range names to the new cell addresses. Suppose the table you've combined into a new worksheet is in range X1..Y15. The range names appear in column X and the corresponding revised cell addresses appear in column Y. Enter the following formula in cell Z1:

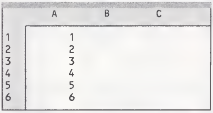
+“/RNC”&X1&“~”&Y1&“~”

Copy the formula from cell Z1 to range Z2..Z15. Then select /Range Value (in *Symphony*, MENU Range Values) and specify range Z1..Z15 as the From range and cell Z1 as the To range. With the cell pointer in cell Z1, press slash (in *Symphony*, MENU). Select Range Name Create, enter *\n* or some unused macro name, and press Return. To run the macro, hold down the MACRO key (Alt on most computers) and press N. The macro assigns all the range names. You can't use this procedure in *1-2-3* Release 1A. The macro for *Symphony* is:

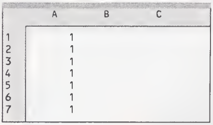
+“{MENU}RNC”&X1&“~”&Y1&“~”

PROBLEM COPYING DOWN A COLUMN

Q. Why is it that when I try to copy a column of values down one cell in the worksheet, I end up with several copies of the column's first value?



	A	B	C
1	1		
2	2		
3	3		
4	4		
5	5		
6	6		



	A	B	C
1	1		
2	1		
3	1		
4	1		
5	1		
6	1		
7	1		

Greg Mosely
Cincinnati Life Insurance Co.
Cincinnati, Ohio

A. *1-2-3* and *Symphony* copy ranges one row at a time. When you copy from range A1..A6 to range A2..A7, your software first copies cell A1 to cell A2. The value in cell A2 becomes 1. Then the software copies cell A2 to cell A3, and the value in cell A3 also becomes 1. This sequence repeats until all the values in range A1..A7 are 1.

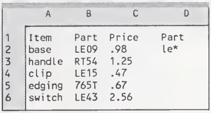
If you want the range of numbers to be one cell lower, use the Move command to move range A1..A6 to range A2..A7.

WILD-CARD MATCHES

Q. How can I extract all database records whose numbers in the Part field begin with LE?

Elaine Connolly
Westwood, Mass.

A. Use a wild-card criterion. When you use the asterisk as the last character in a criterion, a database query will find any labels whose first characters match the first characters of the criterion. In the following example, the Input range (in *Symphony*, Database range) is A1..C6 and the Criterion range is D1..D2. The label *le** in cell D2 is the criterion. This criterion means “select all records whose first two characters in the Part field are le.” The query will find records whose part begins with Le, LE, le, and lE because *1-2-3* Release 2/2.01 and *Symphony* aren't case sensitive.



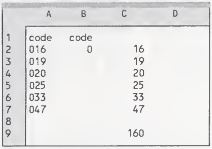
	A	B	C	D
1	Item	Part	Price	Part
2	base	LE09	.98	le*
3	handle	RT54	1.25	
4	clip	LE15	.47	
5	edging	765T	.67	
6	switch	LE43	2.56	

DISPLAYING LEADING ZEROS

Q. I need to create a list of three-digit numbers displaying leading zeros. I use the Data Fill command to generate the list, but the resulting entries lack leading zeros. I want to be able to search the list for codes that fall within a certain range. I also want to be able to calculate the sum and average of the entire column.

Sherry Liber
Malvern, Ohio

A. *1-2-3* and *Symphony* don't display numbers with leading zeros. Instead, enter the list of numbers as labels. Then use the @VALUE function if you need to use these labels as numbers. For example, we created the following list of codes by preceding each number with a label prefix (').



	A	B	C	D
1	code	code		
2	016	0	16	
3	019		19	
4	020		20	
5	025		25	
6	033		33	
7	047		47	
8				
9			160	

To add column A, enter the formula @VALUE(A2) in cell C2 and copy the formula to range C3..C7. The resulting formulas return the numeric equivalent of the codes in range A2..A7. Sum these values by entering the formula @SUM (C2..C7) in cell C9. Use the same values

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CIRCLE 112 ON READER SERVICE CARD

to calculate the average value of the codes.

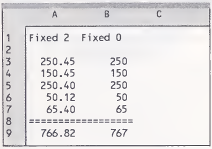
To find all codes that fall within a certain range, specify range A1..A7 as the Input range (in *Symphony*, Database range) and range B1..B2 as the Criterion range. To do this, select /Data Query Input and specify A1..A7, select Criterion and specify B1..B2, then select Quit. In *Symphony* select MENU Query Settings Basic Database, specify A1..A7, select Criterion and specify B1..B2, then select Quit three times. Enter the following formula in cell B2 as the criterion to locate or extract codes greater than 19 and less than 33:

```
@VALUE(A2)>19#AND#@VALUE
   (A2)<33
```

Select /Data (in *Symphony* MENU) Query Find to view the matching records. These techniques will not work in *1-2-3* Release 1A.

FIXED FORMAT AND ROUNDING DOESN'T WORK

Q. When I format the following column of numbers for Fixed with Ø decimal places, the @SUM formula shows an incorrect result. Why?



```
         A          B          C

1  Fixed 2  Fixed 0
2
3    250.45       250
4    150.45       150
5    250.40       250
6     50.12        50
7     65.40        65
8  ==================
9    766.82       767
```

Chester E. Fisher
Tulsa, Okla.

A. The @SUM formula shows an incorrect result because of the cell format. The underlying formula's result is correct. Place the cell pointer on cell B9, press the EDIT key, then press CALC. This returns the formula's true value, which is accurate. Press Escape to avoid changing the cell's contents. Although the result appears incorrect, the formula evaluates correctly.

The Format command lets you change the appearance of a number or of a formula's result. When you assign a Fixed format with fewer decimal places than a number contains, *1-2-3* and *Symphony* round the number, yet retain values accurate to 15 significant digits, regardless of a cell's display format.

For more information about how formatting can affect the display of numbers, refer to "Lives of a Spreadsheet Cell" in the March 1988 issue.

DETERMINING WIDTH OF A PRINT RANGE

Q. Is there an easier way to determine the correct margin settings for a printout than by manually adding up the widths of each column in the Print range?

Jacob Massicotte
Aylmer, Quebec

A. In *Symphony*, switch to a DOC window to determine the width of a Print range. Press TYPE, select DOC, then move the cursor to the last character in the longest row of data. *Symphony* displays the width of the Print range in the control panel. This only works when the leftmost column of the Print range coincides with the leftmost column of the window.

One way to determine the width of a range in both *Symphony* and *1-2-3* Release 2/2.01 is to enter the following formula a few rows beneath the data in the first column of the range to be printed:

```
@CELL("width",A1..A1)
```

For example, if you want to print range A1..I29, enter the formula in cell A32. Next, copy cell A32 to range B32..I32. Enter @SUM(A32..I32) in cell J32. This formula calculates the width of the Print range.

To determine the correct right margin setting, add the left margin setting to the width of the Print range. If the total exceeds your printer's maximum line length, change the Print range, decrease the left margin setting, or use compressed print.

UNDERLINING CHARACTERS IN THE SAME CELL

Q. A coworker showed me how to underline characters in a *1-2-3* cell. On the worksheet it looked something like this:

L<–_O<–_T<–_U<–_S<–_

When he printed it, the word *LOTUS* was underlined. How did he do it?

Richard Martinez
Miami Lakes, Fla

A. You can use the merge character to combine two characters or to print characters that are not in the Lotus International Character Set. To underline the word *LOTUS* in one cell, type *L*, press COMPOSE, type *mg_O*, press COMPOSE, type *mg_T*, press COMPOSE, type *mg_U*, press COMPOSE, type *mg_S*, press COMPOSE, type *mg_*, and press Return.

The merge character appears as either a left arrowhead (◀) or as a left arrow (←), depending on the release of *1-2-3* or *Symphony* and the driver you installed.

This technique doesn't work in *1-2-3* Release 1A.

PROTECTING MACROS

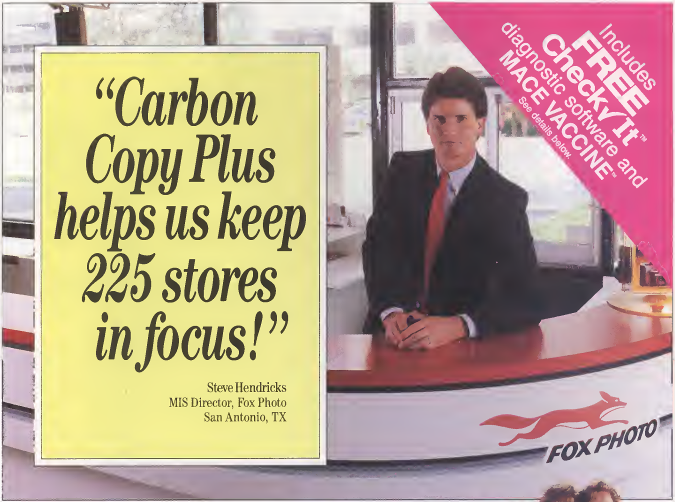
Q. Many of my *1-2-3* Release 2.01 templates contain macros that I don't want other people to view or change. The Worksheet Column Hide command hides the macros, and the Worksheet Global Protection command protects the entire worksheet. But anyone can view the macros if they select /Worksheet Column Display and specify the hidden columns. If they select /Worksheet Global Protection Disable, they can change the macros. How can I "lock" hidden columns?

Rodger W. Kingsbury
Hoffman Estates, Ill.

A. There's no way to lock hidden columns in *1-2-3* or *Symphony*. You can, however, lock a *Symphony* worksheet. Select SERVICES Settings Global-Protection Yes, select Security Lock, enter a password, and select Quit. Now you can't disable global protection unless you enter the password. Instead of hiding the columns that contain the macros, assign the Hidden format to the macro cells. With global protection enabled and the worksheet locked, the contents of hidden cells will not appear in the control panel when you highlight them with the cell pointer.

Locking a *Symphony* worksheet isn't entirely foolproof. Each release of *Symphony* has at least one flaw that lets you reveal the contents of a worksheet locked with an unknown password. The contest in our June issue asked *Symphony* users to submit the best technique for unlocking a worksheet. Refer to the September Q&A column for the contest's results.

In *Symphony* Releases 1.1, 1.2, and 2.0, you can use the Macro Library Manager to protect your macros. The Macro Library Manager lets you save your macros off the spreadsheet in a library you can



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lock with a password. Anyone who doesn't know the password can't view or edit the macro library.

INCORRECT RESULT USING @ISERR

Q. I am using the following @IF formula in my spreadsheet:

> @IF(@ISERR(O123 - K123)/K123,0,
> (O123 - K123)/K123)

When cells O123 and K123 both equal zero, the formula should return zero. I'm getting ERR. What formula should I be using?

Rodney Reid
North Plainfield, NJ

A. The conditional statement in your formula @ISERR(O123 - K123/K123), reduces to the expression zero divided by zero (0/0). Dividing by zero is undefined in mathematics, so your formula returns ERR.

Because dividing by zero is the only problem you need to avoid, try rewriting your formula as follows:

> @IF(K123 = 0,0,(O123 - K123)/K123)

Q&A REVISITED

@CODE AND @EXACT—UPPERCASE VS. LOWERCASE

Q. In the May issue George Svenson asked for a formula that would make a case-sensitive comparison of two strings. You suggested the @CODE function within an @IF formula. This works if you want to compare only the first characters of the strings. A better solution is to use the @EXACT function, which compares the strings and not just their first characters. For example, the formula @EXACT (A1,B1) returns 1 if the entries in cells A1 and B1 are exactly alike. The formula returns 0 if the entries don't match.

Kevin Larsen
Lakewood, Ohio

KEYBOARD LOCKUP

Q. I'm responding to your request for a program that prevents keyboard lockup when you accidentally press the PrintScreen key [Hardware Hints, February 1988]. A program called *Noprtsc* disables the Shift key on the right. To print a screen with this keyboard utility, hold down the Shift key on the left and press the PrintScreen key. The program is available as Disk UHB from Public Brand Software, Indianapolis, Ind. (1-800-426-DISK, in Ind. 317-856-7571).

David Calabrese
Sandy, Utah

@VALUE ELIMINATES ERR WHEN ADDING ACROSS ROWS

Q. I have something to add to your answer to Z. Janosi [October]. You described a formula that automatically recalculates and reflects new product totals across each row. Your formula evaluates to ERR in *1-2-3* Release 2 and *Symphony* if any referenced cell that appears to be blank contains a label prefix. My formula uses the @VALUE function to correctly add across rows in a worksheet even if some of the cells contain labels or label prefixes:

> @VALUE(A3)*A2 + @VALUE(B3)*
> B2 + @VALUE(C3)*C2

Billie Jo McDaniel
Grapevine, Tex.

A. This formula won't work in *1-2-3* Release 1A because Release 1A does not have the @VALUE function. In *1-2-3* Release 2.01, referenced cells that contain a label do not make your formula evaluate to ERR.

CONTEST

DECEMBER CONTEST RESULTS

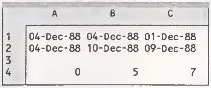
In the December issue we asked users of *1-2-3* Release 2/2.01 and *Symphony* to create a formula that returns the number of weekdays between two dates. The formula should return 1 if the start day and the stop day are the same. The total number of weekdays should include the start day and the stop day, except for start or stop days that fall on weekends.

For example, make sure that the formula returns 1 if the start day is Friday, September 2, 1988, and the stop day is Friday, September 2, 1988. If the start day is Friday, October 14, 1988, and the stop day is Monday, October 17, 1988, the formula should return 2. If the start day is Saturday, September 3, 1988, and the stop day is Sunday, September 4, 1988, the formula should return 0.

We received many entries that used macros, lookup tables, or a series of formulas to solve the problem. The various solutions reveal great ingenuity among our readers. However, there was only one winning solution. Kevin Larsen, of Lakewood, Colo., submitted a single formula that contains 67 characters.

Cell A4 in the figure contains the winning formula, entered as follows and copied to range B4..C4:

> (@INT(A2/7) - @INT(A1/7))*5 +
> @MAX(0,@MOD(A2,7) - 1) -
> @MAX(0,@MOD(A1,7) - 2)



	A	B	C
1	04-Dec-88	04-Dec-88	01-Dec-88
2	04-Dec-88	10-Dec-88	09-Dec-88
3			
4	0	5	7

Let's break this formula into four parts:

The expression @INT(A2/7) determines how many Saturdays have passed between January 1, 1900 and the stop day. This is because every Saturday on the calendar has a different date serial number, but all Saturday date serial numbers yield the same remainder, 0, when divided by 7.

From one Saturday to the next, there are five weekdays. Thus, the expression (@INT(A2/7) - @INT(A1/7))*5 returns the number of weekdays between the Saturday preceding the start day and the Saturday preceding the stop day.

At this point we have to make an adjustment. We must add the number of weekdays that run from the Saturday preceding the stop day through the stop day. That's what the expression @MAX(0, @MOD(A2,7) - 1) does.

Finally, the expression - @MAX (0,@MOD(A1,7) - 2) subtracts the number of weekdays between the start day and its preceding Saturday. ■

This material was prepared by Elizabeth A. Stahl and the Technical Editors, with the help of the Lotus Product Support staff.

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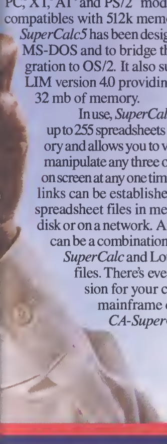
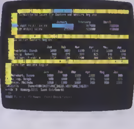
In use, *SuperCalc5* holds up to 255 spreadsheets in memory and allows you to view and manipulate any three of them on screen at any one time. Direct links can be established with spreadsheet files in memory, on disk or on a network. And these can be a combination of *SuperCalc* and Lotus 1-2-3® files. There's even a version for your company mainframe called *CA-SuperCalc®.*





SuperCalc5 was designed to coexist with Lotus 1-2-3. Not only does it read, write and link to 1-2-3 files automatically, *SuperCalc5* includes an optional 1-2-3 menu and can use 1-2-3 macros. You can even move Lotus 1-2-3 macros into *SuperCalc5* and then back again.

Accuracy and speed.
Comprehensive *debugging and auditing* features are built right into *SuperCalc5.* When used along with the *undo* feature, they ensure that errors in your worksheets and macros will not cost more than you can afford.

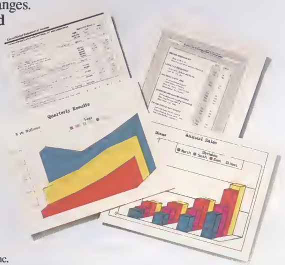
SuperCalc5 works fast because it has *minimal recalculation* and the ability to choose recalculation ranges.

A good beginning and a beautiful finish.
SuperCalc5 has automatic installation and its intuitive command structure means that you can be up and running in a matter of minutes.

Finally, *SuperCalc5* will make your work look sensational. Your presentation will spring to life on the page with a wide choice of graphics, charts, type fonts, bars, colors and shadings.

Two ways to try tomorrow.
Qualified prospects can take advantage of one of two *SuperCalc5* introductory programs. You can receive a copy of *SuperCalc5* to use on your present computer for 30 days with no obligation. Or trade in your present spreadsheet program and get *SuperCalc5* for $100. Both offers expire June 30, 1989. For more information or the name of the participating dealer near you, call 1-800-531-5236. (1-800-663-6904 in Canada).

CIRCLE 116 ON READER SERVICE CARD



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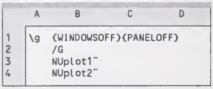
READER TIPS ON USING LOTUS PRODUCTS

1-2-3

PRESENTING GRAPHS WITH A MACRO

I use a large-screen monitor attached to a PC to present graphs to my group. The following macro lets me use *1-2-3* as a slide-presentation program to display my graphs:



```
     A    B          C          D

1   \g   {WINDOWSOFF}{PANELOFF}
2         /G
3         NUplot1~
4         NUplot2~
```

To create the macro, enter labels as shown but replace the labels *plot1* and *plot2* with names of graphs that are in your own worksheet. Add a line for each additional graph in your sheet.

To assign the name *\g* to the macro, select /Range Name Labels Right and indicate cell A1. When you present your slides, hold down the MACRO key (Alt on most computers) and press G.

1-2-3 displays the first graph and pauses until you press any key. When you press a key, *1-2-3* briefly displays a blank screen and then presents the next graph. Each time you press a key, *1-2-3* presents the next graph in the sequence.

John H Boucher
Fair Oaks, Calif.

DELETING WITH GLOBAL PROTECTION ON

Deleting rows or columns with /Worksheet Delete Row or Column doesn't always work as expected. I had global protection enabled, with the first cells of a row unprotected, followed by some protected cells and then more unprotected cells. An attempt to delete the row produced an error, and the computer beeped. When I pressed Escape to clear the error, the unprotected cells at the beginning of the row were deleted, but the protected cells that followed and the unprotected cells following the protected cells were not deleted. There seems to be no way to correct this error.

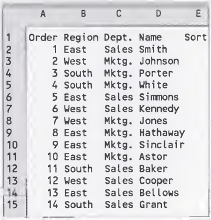
To re-create this situation, enter data in cells A6..C6, select /Worksheet Global Protection Enable, and unprotect cells A6 and C6 by selecting /Range Unprotect and specifying the correct cell. Leave cell B6 protected. With the cell pointer in row 6, select /Worksheet Delete Row, and press Return, then Escape to clear the resulting error. Cell A6 will be erased; cells B6 and C6 will be left.

To avoid the error, be sure to choose /Worksheet Global Protection Disable before deleting any rows or columns. Of course, you'd be wise to save your file before deleting any rows or columns.

Jeffrey S. Sklar
Sebell Publishing Co
Ashland, Mass.

USE DATA FILL TO SORT ON MORE THAN TWO KEYS

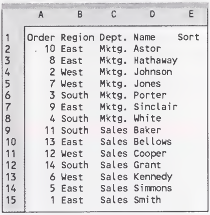
The *1-2-3* Data Sort command lets you use only two sort keys. To sort on more than two keys, I sort the range using the lowest-order sort field as the secondary sort key and the second-lowest-order sort field as the primary sort key. When specifying the records I want to sort, I include an extra column in the Data range. After sorting, I use the Data Fill command to enumerate the records in their new sequence. For the next sort, and for each successive sort, I use this column of sequenced numbers as the secondary sort key. Then I use the next-highest-order sort field as the primary sort key. After each sort, I refill the extra column with numbers to enumerate the records' new sequence.



```
        A      B      C      D        E

1   Order Region Dept. Name     Sort
2       1 East   Sales Smith
3       2 West   Mktg. Johnson
4       3 South  Mktg. Porter
5       4 South  Mktg. White
6       5 East   Sales Simmons
7       6 West   Sales Kennedy
8       7 West   Mktg. Jones
9       8 East   Mktg. Hathaway
10      9 East   Mktg. Sinclair
11     10 East   Mktg. Astor
12     11 South  Sales Baker
13     12 West   Sales Cooper
14     13 East   Sales Bellows
15     14 South  Sales Grant
```

Assume you have a database like the one above. You need to sort the database by regions, with departments broken out within each region and names alphabetized within each department. To try this, enter labels and numbers as shown above. The first field enumerates the records in their original order. Select /Data Sort Data-Range and specify range A2..E15. Specify column C (*Dept.*), which contains department names, as the primary sort key. You do this by placing the cell pointer on any cell in column C that falls within the boundaries of the Data range (in this example, any cell in range C2..C15) pressing Return and entering A



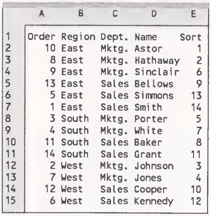
```
       A      B      C      D        E

1   Order Region Dept. Name     Sort
2      10 East   Mktg. Astor
3       8 East   Mktg. Hathaway
4       2 West   Mktg. Johnson
5       7 West   Mktg. Jones
6       3 South  Mktg. Porter
7       9 East   Mktg. Sinclair
8       4 South  Mktg. White
9      11 South  Sales Baker
10     13 East   Sales Bellows
11     12 West   Sales Cooper
12     14 South  Sales Grant
13      6 West   Sales Kennedy
14      5 East   Sales Simmons
15      1 East   Sales Smith
```

for ascending order. Specify column D (*Name*) as the secondary sort key and enter A for ascending order. Then choose Go to sort the database.

The second figure shows the result of the first sort operation. Select /Data Fill, specify range E2..E15 as the Fill range, 1 as the start value, 1 as the step value, and press Return to accept the default stop value. In column E, *1-2-3* enters a sequence of values that captures the order of records after the first sort. To do the final sort, select /Data Sort and specify column B (*Region*) as the primary sort key and column E as the secondary sort key. Select Go, and *1-2-3* sorts the records to appear as they do below.

To sort on any additional fields, use the Data Fill command as described in the paragraph above to enter a new sequence of values in Column E. Then assign a new primary sort key and sort the records once more.



	A	B	C	D	E
1	Order	Region	Dept.	Name	Sort
2	10	East	Mktg.	Astor	1
3	8	East	Mktg.	Hathaway	2
4	9	East	Mktg.	Sinclair	6
5	13	East	Sales	Bellows	9
6	5	East	Sales	Simmons	13
7	1	East	Sales	Smith	14
8	3	South	Mktg.	Porter	5
9	4	South	Mktg.	White	7
10	11	South	Sales	Baker	8
11	14	South	Sales	Grant	11
12	2	West	Mktg.	Johnson	3
13	7	West	Mktg.	Jones	4
14	12	West	Sales	Cooper	10
15	6	West	Sales	Kennedy	12

John A. Beltrami
Consulting Services
Buffalo, N.Y.

1-2-3/SYMPHONY

UPDATING CELLS WITH RELATIVE FORMULAS

I need to have the current month and year appear in several cells on my monthly reports. This means that every month I have to edit each of the cells to reflect the new month. The following technique lets me enter the month and year only once, which reduces editing time and increases accuracy.

I enter the formula +A1 in each cell that has to show the month and year. Then I type the current month and year as a label in cell A1 and press the CALC key. The formulas are updated to show the new date.

John W. Brown
Lufkin-Conroe Telephone Exchange
Lufkin, Tex.

You need to press only the CALC key if your worksheet is set for manual recalculation. This technique doesn't work in 1-2-3 *Release 1A.*

FORMULAS IN MACRO SPECIAL KEY INDICATORS

A variation of the macro special key indicators (which control the cell-pointer movement), UP, DOWN, RIGHT, LEFT, lets the cell pointer move a different distance each time I run the macro. I use a formula within the command. For example, I can enter macro statements like these:

```
{RIGHT A1+A2}

{UP @SUM(A1..A5)}
```

The formulas determine how many cells the cell pointer should move to the right or up on the worksheet. I can use one macro to work with several worksheets and never edit the macro. I need to change values in only the cells that the formulas reference.

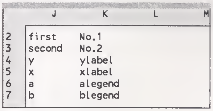
David Coulter
Philips Display Components Co.
Ottawa, Ohio

This doesn't work in 1-2-3 *Release 1A.*

CELL REFERENCES FOR GRAPH TITLES/LEGENDS

I rely on a little-used feature of *1-2-3* and *Symphony*: the ability to enter graph titles and legends by referencing cells within the spreadsheet. To see how this works, enter the graph titles and legends as shown in the figure below.

Select /Graph Options Titles First (in *Symphony*, MENU Graph 2nd-Settings Titles First) and enter *\K2*. Select Titles Second (in *Symphony*, Second) and enter *\K3*, and so on, for the other graph titles and legends.



	J	K	L	M
2	first	No.1		
3	second	No.2		
4	y	ylabel		
5	x	xlabel		
6	a	alegend		
7	b	blegend		

Entering graph titles and legends in the worksheet has several advantages. First, you can group each graph's titles and legends in one area. This lets you use the Copy command to copy titles and legends from one graph to another. Also, you can change the labels, if necessary, without reaccessing the Graph menu. Note, however, that you must update the cell references in the Graph settings whenever you insert or delete rows above or columns to the left of the cells that contain the titles.

Wade A. Wallinger
Aston, Pa.

You won't need to update the cell references in the Graph settings when you insert or delete rows or columns if you name the cells that contain titles and legends. Continuing with your earlier example, select slash (in Symphony, *MENU) Range Name Labels Right, enter range J2..J7, and press Return. Now, instead of specifying the first graph title as* \K2, *enter* \first. *Similarly, to assign the other titles and legends, enter a backslash (\), followed by the range name. Now, whenever you insert or delete rows above or columns to the left of these cells, the range names in the graph titles and legends will continue to refer to the correct cells.*

DARKER PRINT WITH HP-7470A

When I use the *1-2-3* or *Symphony* PrintGraph program to print graphs on an HP-7470A two-pen plotter, I can improve the output if I set the printer to HP 7470A Plotter — 8½ x 11 transp. This causes the plotter to draw more slowly, producing darker, more readable graphs.

Cheryl Wilkinson
Hancock-Wood Electric Cooperative
North Baltimore, Ohio

REVISITED

LASERJET PAGE EJECTION

In the May 1988 issue [Hardware Hints], Pamm D. Butts suggested a way to resolve the page-ejection problem on the HP LaserJet printer. I have an alternative way. Instead of remembering to insert the \012 setup string at the end of each Print range, I usually include the code as the last line in each of my print macros. I place the setup string in a cell and give it a range name, *page* for example. At the end of each print macro, I add the following command:

```
Rpage~AGQ
```

John W. Chenoweth
Orlando, Fla

RECALCULATING MORE THAN JUST ONE CELL

Charles Miwa's idea [September] of using the EDIT key and pressing Return to recalculate just one or a few cells is very useful. But using the Copy command recalculates a range of cells more quickly.

For example, suppose you wish to recalculate all the formulas in range A10..E10. Place the cell pointer on cell A10, press slash [in *Symphony*, MENU], select Copy, and indicate range A10..E10 as the range to copy from. Then specify cell A10 as the range to copy to. This recalculates all the formulas in the range.

Edward J. Regan
The Albany Medical College
Albany, N.Y

HARDWARE

RESETTING KEYBOARD PASSWORD ON PS/2s

I used the PS/2 KP command to set a keyboard password on my IBM PS/2 Model 80. I later needed to change the password, but I didn't know how. The documentation didn't help.

Calls to my dealer and to IBM's technical support staff revealed the solution. To change the keyboard password, enter *KP /C* at the DOS prompt. The Keyboard Lock window appears. Type your new password and press Return. This relocks the keyboard with the new password.

Peter Keene
Buffalo, N.Y

CORRECTING AN INSTALLATION ERROR

When I tried to install *1-2-3* Release 2.01 on an IBM PC XT that has an Intel Inboard 386, I received the message *Installation error code = 8362*, and the installation was terminated. I couldn't run my *1-2-3* System Disk or my Backup System Disk from drive A.

Intel suggested that I enter the following command at the DOS prompt before I run the *1-2-3* hard-disk installation:

```
ISPEEDPC – 1
```

This command slows the speed of the 80386 microprocessor to its lowest speed (1) and corrects the problem.

Thomas V. Rakoczy
National Bank of Detroit
Detroit, Mich

After you issue the recommended DOS command and successfully install and load 1-2-3, *you can increase the machine's processing speed by using the following Intel key combination: Hold down the Control key, the left Shift key, and the Alt key, and press a number from 1 to 4, with 1 signifying the lowest speed and 4 the highest.*

TRANSFERRING ASCII FILES FROM RAINBOWS TO PCs

I needed to transfer *1-2-3* spreadsheets and PRN files that were on floppy disks between a DEC Rainbow computer and an IBM PC. Neither computer can use the disks from the other, even though the disks are the same size. I developed a technique that lets me transfer the files successfully.

I format a floppy disk on the 360K, low-density disk drive of an IBM PC using the DOS command FORMAT/1/8. DOS can store files on only one side of a disk formatted by this command. Consequently, the disk will hold 160,256K of data. Both the IBM PC and the DEC Rainbow can save files to and retrieve files from this disk. I use PC-DOS 3.1 on the IBM PC and MS-DOS 2.1 on the DEC Rainbow.

Leonard Kleczynski
Southington, Conn

MS OS/2 DEVELOPMENT KIT ON PS/2 MODEL 80

I have an IBM PS/2 Model 80 with DOS 3.3, *Symphony*, and other software installed. I tried to install the Microsoft OS/2 Software Development Kit, but the Install program didn't run properly. In fact, the OS/2 Install program corrupted all the files on my hard disk. Luckily, I had a recent backup of my files. I reformatted the hard disk and tried reinstalling the program, but it failed again.

According to Microsoft's technical support staff, a problem occurs when you install this program on any 80386-based machine with an Enhanced Small Disk Interface (ESDI) drive. Microsoft will provide a patch file to correct the problem. To get the patch, either call Microsoft and request the disk, or use your computer to call Microsoft Online and download the reference file named PS/2105A.ARC from the software library.

Beverly Clarke
Los Angeles, Calif.

DOS PRINT COMMAND

The DOS PRINT command is useful when you want to print a file quickly. To see how it works, at the DOS prompt, enter:

```
print myfile.doc
```

Substitute the name of any ASCII file for *myfile.doc*. If you don't use a PATH command to identify the directory that contains your DOS files, you must make current the subdirectory that contains your DOS files and specify the path where the ASCII file is stored. For example, DOS will print *myfile.doc*, which is located in the DATA subdirectory, if you enter the following:

```
print c:\data\myfile.doc
```

The first time you use the PRINT command, DOS displays the message *Name of list device [PRN]*. Press Return, and DOS will print the file on your printer. Your computer will then display the message *Resident part of PRINT installed. Filename is currently being printed.*

Jana Babineau
Exxon, USA
Houston, Tex

Note that you can use the PRINT command to print only ASCII or PRN files. You can't use it to print worksheet files. An alternative way of printing an ASCII file in DOS is to use the DOS TYPE command type myfile.doc > prn. ■

This material is prepared by Subhadra Mattai and the Technical Editors, with the help of the Lotus Product Support staff.

WRITE US

Do you have a favorite technique or way of using your Lotus products or of keeping your hardware and software on speaking terms? Share it! We'll send you $25 if we print your letter. Send them to: Good Ideas, LOTUS *Magazine, P.O. Box 9123, Cambridge, MA 02139–9123.*

MANUSCRIPT 2.0 VS. WORDPERFECT 5.0

Both create effective documents, but *Manuscript* makes it easier to bring together words and data.

BY MARC DAVIDSON

BOB DAHM

Are you sure that you need a desktop-publishing program? If you want complete control over page layout, you probably do. But if you're looking to make your business documents more effective by adding graphics, tables, newspaper-style columns, and a variety of fonts, you may be better served by *Lotus Manuscript* Release 2.0 or *WordPerfect* Version 5.0.

If you're already familiar with word processing, you can use either program to produce publication-quality documents—without having to learn the intricacies of desktop publishing. You won't have to sacrifice much of the editing power of your current program, either. *WordPerfect* 5.0 merely adds desktop-publishing features to what was already the world's best-selling word processor. *Manuscript*, though far less popular, also touts one of the most robust editors around.

If combining spreadsheet data and graphics into your documents is your highest priority, *Manuscript* is the better choice. *Manuscript* lets you import data directly from *1-2-3* or *Symphony* and lets you edit and enhance that data easily once you have it in your document. *WordPerfect* imports data from print files only, a limitation that tends to offset its slightly better capability for importing and manipulating graphics.

If the layout of your document is important—for instance, if you use lots of graphs and tables and you are often restricted to a certain page length—then *WordPerfect* will save you some frustration. As you type, neither program displays your document exactly as it will appear in print, but *WordPerfect*'s screen display is more accurate. While both programs let you preview your document before you print it, *WordPerfect* lets you do so about three times faster.

Each program offers the full range of word-processing functions, but two differences are worth noting. If you create long, structured documents, *Manuscript* has a built-in outliner and features for global editing. If you want to perform automated tasks, such as printing envelopes, *WordPerfect*'s macro language gives you greater facility than *Manuscript*'s simple keystroke recorder.

IMPORTING SPREADSHEET DATA AND GRAPHICS

Manuscript lets you import data directly from *1-2-3* and *Symphony*. You simply move your cursor to the desired position for the data, choose a command from the function-key menu, and specify the file name and the range name of the data you want to import. If you use *Symphony*, you can also import data by window name. Through this same menu, you can easily update the imported data to reflect any changes in your worksheet.

If you want to import worksheet data into a *WordPerfect* document, you must first save the data as a print file. If you regularly update the data and reprint your document, this method will soon become tedious.

Both programs let you superimpose a grid over a table to improve its readability. *Manuscript* lets you place borders around a table, along the edges of columns or rows, and even around what were individual cells in your worksheet. You can choose single-line, double-line, or wide-line borders. These borders remain in place if you import an updated version of the data into the same area of your document, and they adjust if you edit your data once it's in your document.

In *WordPerfect* you can actually draw lines and boxes with your cursor, which means you can draw lines just about anywhere you want. For instance, you can draw a box around a single word in a sentence, which is difficult to do in *Manuscript*. However, this feature has some limitations. You have to redraw your borders every time you import a

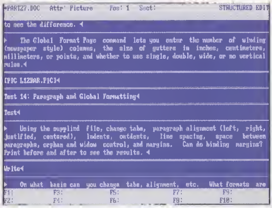
---

Marc Davidson is a free-lance writer and a frequent contributor to LOTUS. *Additional research for this article was done by Judy Housman, a microcomputer trainer and consultant, and Elizabeth Brown, a trainer and consultant specializing in word processing.*

new version of a worksheet table or whenever you increase the length of the data so that it no longer fits within its existing border. Also, the line-drawing feature will not work if you've selected a proportional font, such as Times or Helvetica, for printing your text.

WordPerfect offers a bit more flexibility for importing graphics. While *Manuscript* can import graphs stored in Lotus PIC files, Computer Graphics Metafiles (CGM) from *Lotus Freelance Plus*, Encapsulated Postscript (EPS) files, and five other types of files, *WordPerfect* lets you import all these and more. Both programs have a utility that lets you capture screen images from most software programs.

Neither program displays a graph once you import it; you must preview the document to see the size and position of the graph. *WordPerfect* affords you some control over a graph once you import it, allowing you to reposition it, rotate it, or change its proportions within certain limits. In *Manuscript* you can't rotate a graph. If you want to change a graph's size or position, you have to import it again, because you make those changes only at the time you import a graphic.

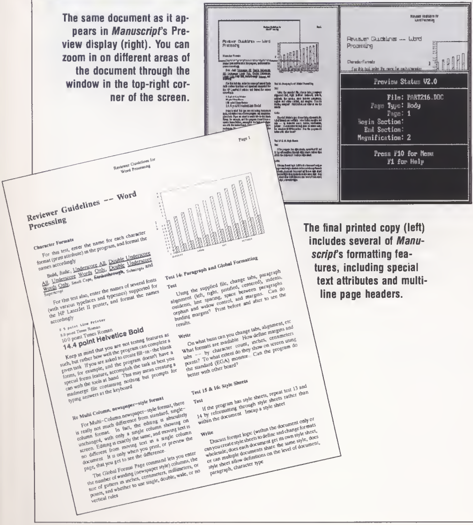


```
*PART27.DOC   Attr' Picture     Pos: 1   Sect:                  STRUCTURED EDIT
to see the difference. ◄
►   The Global Format Page command lets you enter the number of winding
(newspaper style) columns, the size of gutters in inches, centimeters,
millimeters, or points, and whether to use single, double, wide, or no vertical
rules.◄
[PIC LIZBAR.PIC]◄
Test 14: Paragraph and Global Formatting◄
Test◄
►   Using the supplied file, change tabs, paragraph alignment (left, right,
justified, centered), indents, outdents, line spacing, space between
paragraphs, orphan and widow control, and margins. Can do binding margins?
Print before and after to see the results. ◄
Write◄
►   On what basis can you change tabs, alignment, etc. What formats are
F1:           F3:            F5:             F7:          F9:
F2:           F4:            F6:             F8:          F10:
```

LOTUS MANUSCRIPT

***Manuscript*'s editing screen (left) does not display graphs or newspaper-style columns. The code in brackets represents an imported graph.**

The same document as it appears in *Manuscript*'s Preview display (right). You can zoom in on different areas of the document through the window in the top-right corner of the screen.



```
Preview Status V2.0

        File: PART216.DOC
   Page Type: Body
        Page: 1
Begin Section:
  End Section:
Magnification: 2

  Press F10 for Menu
     F1 for Help
```

Reviewer Guidelines for
Word Processing

Page 1

Reviewer Guidelines -- Word Processing

Character Formats

For this test, enter the name for each character format (print attribute) in the program, and format the names accordingly

Bold, *Italic*, Underscore All, Double Underscore All, Underscore Words Only, Double Underscore Words Only, Small Caps, ~~Strikethrough~~, Subscript, and Superscript

For this test also, enter the names of several fonts (with various typefaces and typesizes) supported for the HP LaserJet II printer, and format the names accordingly

8.5 point Line Printer
8.0 point Times Roman
10.0 point Times Roman
14.4 point Helvetica Bold

Keep in mind that you are not testing features as such, but rather how well the program can complete a given task If you are asked to create fill-in-the blank forms, for example, and the program doesn't have a special forms feature, accomplish the task as best you can with the tools at hand This may mean creating a mailmerge file containing nothing but prompts for typing answers at the keyboard

Re Multi Column, newspaper--style format

For Multi-Column newspaper--style format, there is really not much difference from standard, single-column format. In fact, the editing is absoultely unchanged, with only a single column showing on screen. Editing is exactly the same, and moving text is no different from moving text in a single column document It is only when you print, or preview the page, that you get to see the difference.

The Global Format Page command lets you enter the number of winding (newspaper style) columns, the size of gutters in inches, centimeters, millimeters, or points, and whether to use single, double, wide, or no vertical rules

Test 14: Paragraph and Global Formatting

Test

Using the supplied file, change tabs, paragraph alignment (left, right, justified, centered), indents, outdents, line spacing, space between paragraphs orphan and widow control, and margins. Can do binding margins? Print before and after to see the results.

Write

On what basis can you change tabs, alignment, etc What formats are available How define margins and tabs --- by character count, inches, centimeters points? To what extent do they show on screen using the standard (EGA) monitor Can the program do better with other board?

Test 15 & 16: Style Sheets

Test

If the program has style sheets, repeat test 13 and 14 by reformatting through style sheets rather than within the document Imcap a style sheet

Write

Discuss format logic (within the document only or can you create style sheets to define and change formats wholesale, does each document get its own style sheet, or can multiple documents share the same style, does style sheet allow definitions on the level of document, paragraph, character type

The final printed copy (left) includes several of *Manuscript*'s formatting features, including special text attributes and multi-line page headers.

COLUMNS AND TABLES

Both programs let you arrange your text in newspaper-style columns on the same page. By setting your text into two or three columns, you reduce the length of each line, which makes your document easier to read.

In *WordPerfect* you have the option of seeing the columns side by side on the screen. The line breaks appear on the screen just as they will in your printout. As you edit, the program snakes text from column to column and from page to page, as necessary.

Manuscript doesn't display newspaper-style columns on the edit screen, so you see them only when you preview or print your document. Furthermore, each line on your screen will be 80 characters long, regardless of the width you specify for your columns. That makes it harder to estimate the effect that editing will have on your layout.

In *WordPerfect* you can center a graphic between two columns of text, and the text will snake around the graphic. In *Manuscript* a graphic must be positioned in one column or another.

Both programs let you create "parallel" columns that enable you to keep related text lined up across adjacent columns, even if you edit the material in one of the columns. A script is one application of parallel columns, because the names of the speakers must remain lined up with their lines in the script.

You can also use parallel columns instead of tabs to create tables. You simply line up related data across each column. If you have to add a line to any item in one column of the table, the program automatically adds a line in all the other columns so that the related information remains lined up horizontally across the columns.

While it's easy to create tables this way with either program, *Manuscript* makes it easier to edit and expand them. In *Manuscript* you can insert a column between two existing columns. If you want to do that in *WordPerfect*, you have to either rebuild the table or use tabs to break one of the columns into two.

WHAT YOU SEE

As stated earlier, neither program offers true WYSIWYG (what you see is what you get), but *WordPerfect* comes closer than *Manuscript*. Line breaks will print out just as you see them on screen, as will most other layout characteristics. The program doesn't show your type in the font you've specified unless you use a Hercules graphics card with RamFont. It does, however, display fewer characters per line when you use a large type size and more characters per line when you use a smaller type size.

Like *WordPerfect*, *Manuscript* will display print attributes in different colors on your screen if you have an Enhanced Graphics Adapter or a Video Graphics Array card. Otherwise, *Manuscript* doesn't even attempt to duplicate your output on the screen. The program will display parallel columns, but the text within these columns will not necessarily be printed as it was displayed. *Manuscript* doesn't even calculate page breaks until after you preview or print your document, and these page breaks don't adjust as you edit. You have no sure way of knowing what page you're on as you type.

Because these programs have relatively unformatted displays, you need to preview your document before printing. Each program lets you see your document on screen almost exactly as it will appear in print—including graphics, columns, and different type sizes. However, neither program's preview feature reproduces your typefaces on screen. Both let you move through your preview document page by page, view the layout of a full page, or zoom in for detail. With *WordPerfect* you can even preview two pages at once, which is a help if you're laying out your document in book style.

Manuscript's preview feature is much slower than *WordPerfect*'s. In our tests on an 80286-based computer, *Manuscript* took 22.8 seconds to display a page containing a graphic. *WordPerfect* took only 6.3 seconds to display the same page. A slow previewing process can be frustrating if you work with a document that includes graphs, tables, or lots of formatting. Since you can't see these features as you edit, you should probably preview the document often.

Both *Manuscript* and *WordPerfect* offer a solid set of basic editing features for manipulating and formatting text. *Manuscript*, however, includes editing features designed to make it easier to organize and edit large documents.

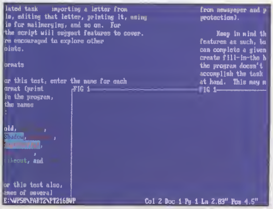
LONGER DOCUMENTS

A *Manuscript* document is made up of blocks. Typically, you define each paragraph as a single block, and you can copy, move, and delete a block or a group of blocks just as you would individual words.

If you write business plans, marketing studies, and other forms of business documents where the need for organization is great, you can use *Manuscript*'s built-in outliner. With the outliner you can group blocks into sections or subsections and collapse your document into headings

WORDPERFECT

You can see newspaper-style columns on *WordPerfect*'s editing screen (right). The box represents the placement of an imported graph.



```
lated task    importing a letter from                    from newspaper and p
le, editing that letter, printing it, using              protection).
is for mailmerging, and so on.  For
the script will suggest features to cover.                   Keep in mind th
re encouraged to explore other                           features as such, bu
oints.                                                   can complete a given
                                                         create fill-in-the b
ormats                                                   the program doesn't
                                                         accomplish the task
or this test, enter the name for each                    at hand.  This may m
ormat (print             FIG 1──────────────────────────FIG 1──────────
in the program,
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:

old,         ,
Shadow,        ,
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or this test also,
ames of several
E:\WP50\PART2\PT216BWP                        Col 2 Doc 1 Pg 1 Ln 2.83" Pos 4.5"
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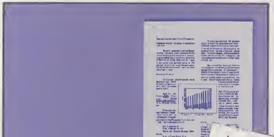
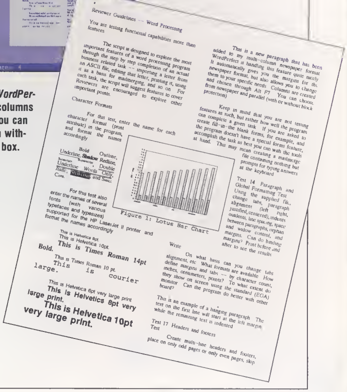


With *WordPerfect*'s Preview feature, you have the option of viewing two facing pages at once.



Reviewer Guidelines -- Word Processing

You are testing functional capabilities more than features

The script is designed to explore the most important features of a word processing program through the step by step completion of an actual business related task -- importing a letter from an ASCII file, editing that letter, printing it, using it as a basis for mailmerging, and so on. For each task, the script will suggest features to cover. Reviewers are encouraged to explore other important points.

Character Formats

For this test, enter the name for each character format (print attribute) in the program, and format the names accordingly

Bold, Outline, Underline, Shadow, Redline, Subscript, Superscript, Double Underline, Words Only, Italic, Strikeout, and Small Caps.

For this test also enter the names of several fonts (with various typefaces and typesizes) supported for the HP LaserJet II printer and format the names accordingly

This is Helvetica 8pt.
This is Helvetica 10pt.
This is Times Roman 14pt Bold.
This is Times Roman 10 pt.
This is courier large.
This is Helvetica 6pt very large print
This is Helvetica 8pt very large print.
This is Helvetica 10pt very large print.

Figure 1: Lotus Bar Chart

This is a new paragraph that has been added to my multi-column newspaper format. WordPerfect is handling this feature quite nicely. It automatically gives you the margins for the newspaper format, but also allows you to change them to your specific needs. Columns are created and chosen through Alt F7. You can choose from newspaper and parallel (with or without block protection)

Keep in mind that you are not testing features as such, but rather how well the program can complete a given task. If you are asked to create fill-in-the blank forms, for example, and the program doesn't have a special forms feature, accomplish the task as best you can with the tools at hand. This may mean creating a mailmerge file containing nothing but prompts for typing answers at the keyboard

Test 14 Paragraph and Global Formatting Test
Using the supplied file, change tabs, paragraph alignment (left, right, justified, centered), indents, outdents, line spacing, space between paragraphs, orphan and widow control, and margins. Can do binding margins? Print before and after to see the results

Write

On what basis can you change tabs alignment, etc. What formats are available. How define margins and tabs -- by character count, inches, centimeters, points? To what extent do they show on screen using the standard (EGA) monitor. Can the program do better with other board?

This is an example of a hanging paragraph. The text on the first line will start at the left margin while the remaining text is indented

Test 17 Headers and footers Test

Create multi-line headers and footers, place on only odd pages or only even pages, skip

Unlike *Manuscript*, *WordPerfect* lets you snake columns around a graphic. You can also rotate the graph within the graphic box.

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and subheadings. If your outline is too general or too specific, you can easily split sections or join them together.

Compared with *Manuscript*, *WordPerfect* is less capable of managing long, highly structured documents. *WordPerfect* can generate an outline representing a series of separate files to be printed as one document. Pagination and footnotes will, of course, be sequential. However, since the document remains divided among several files, you have less flexibility if you wish to reorganize the entire document than you'd have with *Manuscript*, which can contain the entire document in one large file.

WHEN YOU PREVIEW YOUR DOCUMENT IN MANUSCRIPT OR WORDPERFECT, YOU SEE IT ALMOST EXACTLY AS IT WILL APPEAR IN PRINT, INCLUDING GRAPHS, COLUMNS, AND TYPE SIZES.

WordPerfect's outstanding editing feature is its "undelete" capability, arguably the best in any word processor. When you choose this feature, the program displays your last deletion. You can either retrieve that deletion or view up to two previous deletions. Because you can store three deletions, you have more flexibility when cutting and pasting text. You can cut text, hold it, and paste it at your convenience, without worrying about overwriting it with your next deletion.

Both programs let you divide your screen into two windows so that you can work on two files at the same time. This is convenient for cutting and pasting between files and for comparing two versions of the same document. *WordPerfect* also lets you open two windows on the same file, which makes it easy to refer to other areas of your document without scrolling back and forth. But beware: If you edit in one window, the changes are not made in the other. Furthermore, if you save from both windows under the same file name, the file in the second window you save will overwrite the other file. That means you have to restrict your editing to one window, which lessens this feature's usefulness.

Some word-processing tasks, such as addressing envelopes, can be made more efficient with macros. *WordPerfect* includes a macro language that offers as much programming potential as *1-2-3*'s. While testing *WordPerfect*, we easily created a macro that finds an address in a letter, marks it, stops to give the user a chance to modify the address, and prints the address on an envelope. *Manuscript* does not have a macro language; its macro facility simply records and plays back keystrokes. That means you can't write a macro that pauses for the user's input.

Each program includes adequate mail-merging capabilities, a spelling checker, a thesaurus, and footnotes. *WordPerfect* also offers complete control over its print queue and a file-management feature that lets you move and copy files without going to DOS.

Of the two programs, *Manuscript* is easier to learn. If you like to learn by doing, you'll go far with *Manuscript*'s cross-referenced help screens and logical menu structure. You'll have a harder time learning *WordPerfect* as you work. The menu structure follows a peculiar logic. For example, the Copy command is a third-level menu choice under the Move function key. The on-screen help provides useful reminders if you're already familiar with the program, but not enough information for a beginner. Perhaps that's why *WordPerfect*'s manufacturer recommends that you go through a 400-page workbook before attempting any serious tasks with the program. ■

IN BRIEF

Lotus Manuscript Release 2.0. Lotus Development Corp., 55 Cambridge Pkwy., Cambridge, MA 02142; 617-577-8500. Runs on the IBM PC XT, PC AT, PS/2, and compatible computers. Requires 512K of RAM (640K recommended), DOS 2.0 or higher, a hard disk, and a graphics card for the document-preview feature. Released 6/88. $495. 90-day warranty for defects in program or disk.

WordPerfect Version 5.0. WordPerfect Corp., 1555 North Technology Way, Orem, UT 84057; 801-225-5000. Runs on the IBM PC, PC XT, PC AT, PS/2, and compatible computers. Requires 384K of RAM (512K recommended), DOS 2.0 or higher, and a graphics adapter and monitor for the graphics and page-preview features. A hard disk is recommended. Released 5/88. $495. Unlimited, money-back guarantee.

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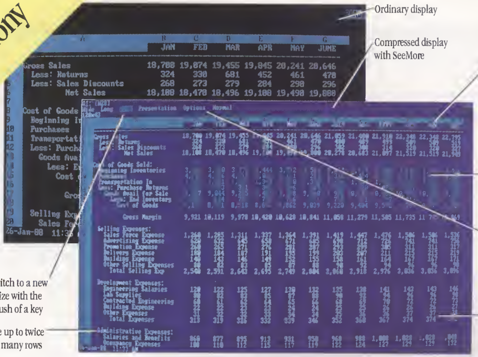
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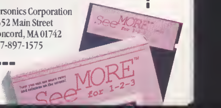
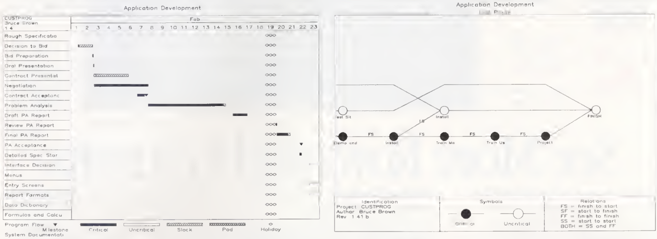


CIRCLE 117 ON READER SERVICE CARD

PROJECT CALC

Schedule, budget, and chart your projects in your spreadsheet.

BY BRUCE BROWN



Samples of *Project Calc*'s Gantt (left) and PERT charts, printed through *1-2-3*'s PrintGraph program on a Hewlett-Packard LaserJet printer. Because *Project Calc* saves these charts for printing in PIC format, you can enhance them with any graphics program that reads Lotus PIC files.

Here's *Project Calc*'s definition of quick and easy project management: You create a project schedule in your spreadsheet, analyze it with Gantt and PERT charts, and dynamically link it to the budget worksheet you'll use to develop other reports.

True, this $179.95 add-in for *1-2-3* or *Symphony* (I tested the *1-2-3* version) lacks the breadth and power of stand-alone project-management programs. You won't find such features as resource smoothing, conflict resolution, and the ability to reconcile task and project priorities among multiple projects. Curiously, however, therein lies its strength. Its easy-to-learn methods make it accessible to project-management novices who find full-function project-management software too complex.

One of *Project Calc*'s shortcomings, though, applies to even the simplest projects. The program won't let you name individual resources, such as particular employees. That makes it more difficult to analyze your use of resources and can limit your ability to control schedules and costs.

GRAPHICS

Project Calc produces both Gantt and PERT charts (see illustrations). A Gantt chart superimposes a horizontal bar chart over a calendar, with each bar representing one task. The chart provides a quick project overview: when each task begins and ends, which tasks overlap, and how much slack time exists for each task. A PERT chart is a network diagram that illustrates how the tasks interrelate. A glance at the PERT chart reveals the sequence in which tasks must be completed and shows which tasks depend on the completion of other tasks.

Both charts show which tasks form a project's critical path—the tasks that, if delayed, will slow down the entire project. With a quick look at either chart, you know which tasks to monitor closely. You can also see how changing the schedule for any task affects the rest of the project.

You can view the charts on the screen and print them with *1-2-3*'s or *Symphony*'s PrintGraph program. When you print, you can opt to compress onto a single page a graph that occupies several screens.

In addition to its graphs, the program produces four kinds of tabular reports: early and late task start and finish times, costs per time period, schedule constraints, and cost and resource assignments by task. None of these reports are particularly fancy, but since they're stored on the worksheet, you can edit and format them as you would any other worksheet data.

THE PROJECT SCHEDULE

The program's menu steps you through the scheduling of each project task. Because the menu-driven method makes it so easy to plan a project, most people do

Bruce Brown writes about microcomputer software and hardware for various computer-industry publications.

it that way. However, you can also enter your data directly on the worksheet by writing special @functions. Indeed, some proficiency with those @functions is the key to analyzing your project plan on your worksheet. For example, entering *@TASKCOST(task4)* in a cell returns the total cost of a task you earlier identified as "task4."

The program gives you some flexibility when defining your tasks. You can schedule tasks by hours, days, weeks, months, quarters, or years. You can define a project calendar so that *Project Calc* can take into account the length of your workday and holidays as it calculates the duration of each task. You can relate the start date of one task to the finish date of another, or you can schedule them independently.

RESOURCE ALLOCATION

You have less flexibility when assigning resources. You can assign resources by cost as a fixed amount, as a rate per time period, or as a rate per resource unit per time period (for instance, two employees who are each paid at $20 per hour). But you can't name your resources or distinguish between them.

This limitation will hamper you most if you want to track the assignment and performance of individual resources. For instance, if you want to know which employees are working on tasks due on a particular date, you can't get that information by manipulating the data in your project schedule.

You may also find it difficult to assign resources exactly as you'd like. Suppose you want to assign several employees, each of whom earns a different wage, to the same task. If you want each employee to work the same amount of time on the task, you'll have to average their wages and assign them as one employee, which means more work for you. It's even harder to assign these employees to work for different amounts of time on the same task—which you may want to do to meet deadlines, work within budget constraints, or otherwise make the most of your resources.

According to the manufacturer, a new release of *Project Calc* will allow you to name resources, track them in your reports, and assign them in the ways described above. The upgrade will also let you create a separate calendar for each resource, chart its scheduling and allocation, and automatically revise your project schedule to account for resource availability (a process called resource leveling).

Once you've established your costs, the program gives you several ways to distribute them over time. You can specify that a task accrue costs at its start date, at its end date, evenly throughout its duration, or evenly throughout the project.

When you're ready to link your scheduling data to your budget worksheet, one @function, @PERCOST, merits special mention. You can use @PERCOST to distribute the cost of any task over the appropriate time periods in your budget. The @function will allocate costs according to the accrual method defined in the schedule. If you modify your schedule, the @function will redistribute costs accordingly.

Project Calc manifested a perplexing bug during my tests. The program sometimes crashed, but only with very small projects, while or immediately after displaying graphs. The problem occurred while I was using either of two Enhanced Graphics Adapters and an IBM PC AT. It couldn't be replicated on another computer running one of the same EGA boards or on a Grid computer equipped with a Color Graphics Adapter. Although I couldn't pin down the cause of the problem during my tests, the program's publisher is looking into it.

On the subject of hardware, your computer should have a full 640K of RAM, if not additional expanded memory. If you start with 640K of conventional memory and load DOS 3.2, *1-2-3*, and *Project Calc*, you'll have just 207K remaining for data. Unless you have expanded memory, that's a limit you'll have to accept. You can increase the available RAM to 334K by detaching one of the two add-ins that make up *Project Calc*. If you do, you'll lose the menus, so you'll have to be proficient with the program's special @functions. Unfortunately, you'll also lose the ability to display graphs and the project calendar, both important parts of the program. ■

IN BRIEF

Project Calc Version 1.11. Frontline Systems, 140 University Ave., Suite 100, Palo Alto, CA 94301; 800-451-0303, ext. 55. Requires 640K of RAM and *1-2-3* Release 2/2.01 or *Symphony* Release 1.1, 1.2, or 2.0; hard disk recommended. Released 5/88. $179.95. 30-day, money-back guarantee.

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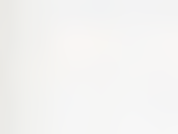

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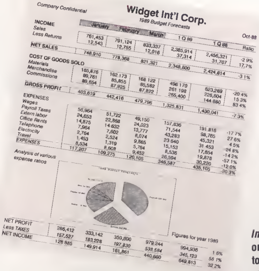
CIRCLE 119 ON READER SERVICE CARD

Impress: Presentation-Quality Reports, and More



Company Confidential

Widget Int'l Corp.

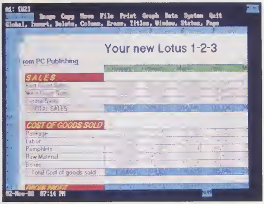
1989 Budget Forecasts

	January	February	March	1 Q 89	1 Q 88	Oct-88 Ratio
INCOME						
Sales	761,453	791,124	833,337	2,385,914	2,456,321	-2.9%
Less Returns	12,543	12,755	12,016	37,314	31,707	17.7%
NET SALES	748,910	778,368	821,321	2,348,600	2,424,614	-3.1%
COST OF GOODS SOLD						
Materials	165,676	162,173	168,122	496,170	623,289	-20.4%
Merchandise	89,761	85,855	85,582	261,198	226,604	15.3%
Commissions	89,654	87,925	87,822	265,400	144,680	83.4%
GROSS PROFIT	403,619	442,416	479,796	1,325,831	1,430,041	-7.3%
EXPENSES						
Wages	56,964	51,722	49,150	157,836	191,816	-17.7%
Payroll Taxes	24,653	22,868	24,023	71,544	98,765	27.6%
Extern labor	14,875	14,632	13,777	43,283	45,321	4.5%
Office Rents	7,964	7,602	8,074	23,640	31,453	24.8%
Telephone	2,764	2,524	9,865	15,153	17,654	-14.2%
Electricity	1,453	1,319	5,764	8,536	19,878	-57.1%
Travel	8,534	8,608	9,452	26,594	30,220	-12.0%
EXPENSES	117,207	109,275	120,105	346,587	435,105	-20.3%
NET PROFIT	286,412	333,142	359,890	979,244	994,936	1.6%
Less TAXES	157,527	183,228	197,830	538,584	345,123	56.1%
NET INCOME	128,885	149,914	161,861	440,660	649,813	32.2%

Analysis of various expense ratios

Figures for year 1989

Impress is a *1-2-3* add-in that not only upgrades your printed reports to presentation quality but does the same for *1-2-3*'s on-screen display.



It's going to be hard to remain satisfied with *1-2-3*'s normal display and printing abilities. First there was *Allways*, an add-in that turns *1-2-3* into a low-end desktop publisher. (See the *Allways* tutorial in the Special Report in this issue.) Now there's *Impress*, which not only upgrades your printed reports to presentation quality but works similar magic on the appearance of the worksheet on your display.

Unlike *Allways*, which you invoke only when you format and print your report, *Impress* lets you do all your *1-2-3* work in its graphical environment (see illustration). The what-you-see-is-what-you-get worksheet display makes *1-2-3* more pleasant to work with and can make your data-entry screens more effective. Naturally, a graphical screen responds more slowly than a character-based screen, so the faster your computer, the better. Otherwise, the cost to you is $139 and roughly 100K of RAM.

You can choose from 4 type styles, 8 colors, 4 levels of shading, and 22 type sizes (from 3 points to 24 points); create boxes, frames, and both double and single underlines; zoom in or out of any portion of the display; vary the height of rows; and save combinations of feature settings and recall them for use with any worksheet. You can also combine graphs with spreadsheet data on the same screen or printed page. The program dynamically links the two, so the graphs immediately reflect changes to spreadsheet numbers.

The features of *Impress* that improve your printed reports have a similar effect on your on-screen work with *1-2-3*. Boxing and framing can set off ranges more effectively than separating them with the empty rows, equal signs, or asterisks you typically use with *1-2-3*. Few people have the printer to make use of *Impress*'s ability to print in color. But since that feature extends to the screen as well, you can use color to highlight names, section titles, specific values, or any numbers.

Impress has to be compared with three alternatives: *1-2-3* alone, *Microsoft Excel*, and Funk Software's *Allways*. The tremendous improvement over *1-2-3*'s screens and reports is obvious. With *Impress* you can set up effectively designed spreadsheets that use color, fonts, lines, and boxes to improve clarity and ease data entry. Both screen display and paper output can include graphs, which can be made interactive.

Unlike *Excel*, you can't use a mouse to edit screens with *Impress*. However, *Excel* doesn't let you print graphs on the same page with spreadsheets, nor does *Excel* give you the same cell-by-cell control of type style and size. If you have a PC XT or a compatible model, you'll need extra memory and an add-in board to run *Excel*, whereas you can use *Impress* with whatever equipment you use to run *1-2-3*.

The call between *Impress* and *Allways* is closer. The most significant difference is that *Impress* lets you enhance not only the printout but also the worksheet display. *Allways* does nothing to improve your display while you work with *1-2-3*—certainly not for data entry and, arguably, not for on-screen analysis either. Another plus for *Impress* is its use of *1-2-3*'s printer drivers, which means that if your printer prints with *1-2-3*, it will print with *Impress*. Although *Allways* works with a wide range of printers, it doesn't support the full range of devices supported by *1-2-3*.

A final note. In the United States, Lotus Development Corp. is sponsoring a promotion through which participating retailers give you a copy of *Allways* when

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LOTUS
EDITORIAL EVALUATION
MARCH 1989

I am a 1-2-3/Symphony:
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TELL US HOW WE DID

The editors of *LOTUS* would appreciate your evaluation of the articles in this issue. This is easier than it may appear, and no postage is required.

1 Get the assigned number for each article from the Editorial Evaluation list on the facing page.

2 Find the article's number in the top row of the evaluation section of the card.

3 Circle the number that reflects your evaluation. If an article did not interest you at all, circle number 5.

We encourage you to *comment* on, as well as evaluate, the contents of this issue. Thanks in advance.

EDITORIAL EVALUATION

Your comments about *LOTUS* magazine help us bring you the best editorial product each month. To rate the articles in this issue, scan the list below and refer to the EDITORIAL EVALUATION card on the bottom of the insert to the left. Identify the number corresponding to each article, then circle the number on the card that reflects your rating.

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you purchase a copy of *1-2-3* Release 2.01. While that promotion constitutes an endorsement of *Allways*, consider that in Europe, it's *Impress* that Lotus chose for its promotion. —*Bruce Brown*

Impress Version 1.0. PC Publishing, 1801 Avenue of the Stars, Los Angeles, CA 96007; 800-634-4555. Requires *1-2-3* Release 2/2.01, 100K of RAM in addition to the RAM used by *1-2-3*, a hard disk, and a Hercules Graphics Adapter, CGA, EGA, or VGA and compatible screen. Note: CGA systems cannot display all of *Impress*'s enhancements. Uses *1-2-3*'s printer drivers. Released 1/89. $139.

CIRCLE 1 ON READER SERVICE CARD

WORKSHEET UTILITIES

1-2-3/Symphony Add-in Shows Your Entire Worksheet

Panorama for 1-2-3 lets you see a map of your whole worksheet with symbolic representations of your data. You can see the current location of your cell pointer and navigate to any other location easily. You can undo the last action, as well as search, replace, erase, copy, and move data. If you select a range to print, *Panorama* lets you see on which pages the data will appear.

The program displays all the named ranges, each within a window with the range name listed across the top. You can move data contained in any range. If you format the destination range, you can decide to keep the moved data in its original format or change it to the format of the new range.

You can choose from seven zoom levels to see the entire worksheet or to see only a little more than *1-2-3* or *Symphony* normally displays. Because the type size in the map view is very small, the program lets you display a window showing the cell pointer and the eight contiguous cells in their normal sizes.

Requires *1-2-3* Release 2/2.01 or any version of *Symphony* and a graphics card. Uses 52K of RAM with *1-2-3* and 58K with *Symphony*. $95 until 4/30/89, $145 thereafter, from Intex Solutions, 161 Highland Ave., Needham, MA 02194; 617-449-6222.

CIRCLE 2 ON READER SERVICE CARD

1-2-3/Symphony Add-in Saves Worksheet Space Used by Tables

From your worksheet *@ELOOKUP* lets you retrieve data from tables in disk-based ASCII files. You can read these tables from any worksheet, and they may be of any size. This scheme saves worksheet space otherwise occupied by the table. Because you'll use just one table file rather than duplicate it in every worksheet, that table is easier to keep up-to-date. You can build these ASCII files with most database programs, including any version of *dBase*, *1-2-3*, and *Symphony*.

Requires *1-2-3* Release 2/2.01 or any version of *Symphony*. Uses 18K of RAM in *1-2-3*, 25K in *Symphony*. $49.95, from Goldata Computer Services, 2 Bryn Mawr Ave., Bryn Mawr, PA 19010; 800-432-3267.

CIRCLE 3 ON READER SERVICE CARD

OTHER UTILITIES

Transfer Files Between Different Graphics Packages

Micrografx Passport lets you exchange files among the following file formats: CGM (Computer Graphics Metafile), *AutoCAD*'s DXF, *MacDraw*'s PICT, and Micrografx's (not Lotus's) DRW and PIC. This means that you can use drawings from one program in another graphics application.

Runs on the IBM PC AT and compatible computers with 512K of RAM. Requires *Microsoft Windows*, a run-time version of which is included. $395, from Micrografx, 1303 Arapaho Rd., Richardson, TX 75081; 800-272-3729; in Tex. 214-234-1769.

CIRCLE 4 ON READER SERVICE CARD

Parse Data into 1-2-3 or Symphony Worksheet

Zeno, a data-transfer utility with artificial intelligence, makes it easy to parse ASCII data from any source into *1-2-3* and *Symphony* worksheets. The program formats the worksheet and retains commas, decimals, and column widths of the incoming ASCII data. You can choose to parse the incoming data into comma-delimited *dBase* files as well.

MOLLY QUINN

Runs on the IBM PC, PS/2, and compatible computers and uses 256K of RAM. $269, from Flinder Software Laboratories, 340 Harris Hill Rd., Williamsville, NY 14221; 800-451-0303 ext. 72.

CIRCLE 5 ON READER SERVICE CARD

Shareware Disk/File Manager

Treeview lets you organize and manage all files on a floppy disk, hard disk, and local area network. The program lets you display a hierarchical tree of all directories. You can see the file-name listings of as many as six directories in separate windows at once. The program lets you do the following to your files: move, rename, erase, hide, convert to read-only, archive, and back up. It supports a mouse, DOS 4.0, and 43-line EGA and 50-line VGA displays. You can view files in ASCII or hexadecimal format.

The program lets you run an application program by pointing to any file extension that it recognizes. For example, if you select WKS from a file listing, the program will load *1-2-3* from your hard disk. *Treeview* can recognize file extensions for and let you run as many as 30 programs, which you select.

Runs on the IBM PC, PS/2, and compatible computers with 132K of RAM. $39.95, from Magee Enterprises, P.O. Box 1587, Norcross, GA 30091; 800-662-4330; bulletin board service, 404-446-6650; CompuServe, 76004,1541.

CIRCLE 6 ON READER SERVICE CARD

FINANCIAL

1-2-3–Based Small-Business Applications from Lotus

1-2-3 Business Applications is a series of templates designed for financial analysis and planning. The templates operate on data from your income statement and balance sheet.

The analysis templates provide a cash flow statement and identify your current cash position, highlight nonoperating items that affect cash inflow and outflow, calculate key financial ratios, create an income statement based on fixed and variable costs, and calculate break-even volume. The planning templates project a cash budget that spans 12 time periods, identifies how much new financing you will require and when, and provides pro forma financial statements for what-if analysis.

Runs with all releases of *1-2-3* and *Symphony* and uses 120K of RAM. $79, distributed by Lotus Selects, P.O. Box 9172, Cambridge, MA 02139; 800-635-6887.

CIRCLE 7 ON READER SERVICE CARD

Statistics/Forecasting Add-in Designed for Nonstatisticians

TrendSetter Expert is an add-in designed for people with little background in statistics but who must forecast sales, project expenses, or plan inventories. Using

MOLLY QUINN

The @functions #1 Library

Treat Yourself to *Dozens* of New Lotus @functions

EXTERNAL LOOKUPS are @functions that return data from other spreadsheets on disk. @2WAYLOOKUP @EXTHLOOKUP @EXTVLOOKUP @WKSGET

FINANCIAL functions perform summation, weighted averages and growth rate calculations. @BEGRANGE @GROWTHRATE @ENDRANGE @PRODUCT @GROW @WAVG

CALENDAR @functions refer to a user-created working day calendar, and return date and logical information about that calendar. @DATEADD @NTHWDAY @ISWORKING @DATEDIFF @LWDOM @FWDOM @NWDOM

LOGICAL functions produce values based on the result of conditional statements. @ISALPHANUMERIC @CONTAINS @ISNUMERIC @ISTIME @ISDATE @ISALPHA @ISEVEN @BEGINS @ENDS @ISODD

SPECIAL @FILEEXISTS

STRING functions manipulate strings and return information about strings. @ALPHANUMERIC @LESSSPACE @NUMERIC @ZEROES @ALPHA @SPLIT @SPLITN @CRDR @SPLITF @ZERO

DATE and TIME @functions use and generate date and time numbers. @DATESTING @WEEKDAY @DAYN @WEEK @FDOM @LDOM

Put dozens more @functions at your fingertips with @functions #1, a collection of 45 add-in @functions you use like Lotus' own. Powerful functions let you lookup data from external worksheets, perform calendar searches, and calculate growth rates and weighted averages.

Glance through the list of functions; as PC WEEK has said, "each set by itself justifies the product's modest $95 cost!"

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CIRCLE 120 ON READER SERVICE CARD

historical data stored in your *1-2-3* or *Symphony* worksheet, the program lets you perform time-series extrapolations using linear regressions, as well as single-exponential and double-exponential smoothing routines. You can set a confidence level for the projections and determine seasonality. The program lets you make a detailed report showing the upper and lower bounds, seasonality, slope of linear regression lines, and mean and standard deviations of the forecast. The program also shows all forecasting assumptions on which the projections are based.

Requires *1-2-3* Release 2/2.01 or *Symphony* Release 1.1 or 2.0 and uses 170K of RAM. $149, from Concentric Data Systems, 18 Lyman St., Westboro, MA 01581; 800-325-9035, in Mass. 508-366-1122.

CIRCLE 8 ON READER SERVICE CARD

PROJECT MANAGEMENT

Project Manager for Multiple Departments

Project Forecaster/Reporter uses integrated *1-2-3* templates to plan and track a large project. The Forecaster template accounts for costs that include 20 different job titles with different hourly rates. The program records the original forecast and all changes to it.

The Resource Analyzer combines data from every worksheet that is related to the project and also produces a report of underutilized and overutilized resources for the project. The program can accommodate as many as 200 resource items.

The Project Reporter lets you issue a summary of the original plan, the most recent plan, and the actual expenses. You can present the reports in parallel form, for side-by-side comparison, or on a line graph. The report shows figures for as many as 11 departments at once and gives estimates of year-end spending based on variances between the forecast and actual expenses.

Runs with all versions of *1-2-3* and requires 640K of RAM. $79.95, from Cinnamon Microsystems, P.O. Box 29494, Minneapolis, MN 55429; 612-574-1697.

CIRCLE 9 ON READER SERVICE CARD

Plan and Monitor Your Work-Group's Activities

Syzygy gives managers a structure for defining a work group, creating objectives, setting up projects, and assigning tasks. Managers and work-group members, with and without PCs, can share information about their work by using the program to generate electronic and printed memos. *Syzygy* runs on a local area network or as a stand-alone package. By means of a menu selection, the program lets you import and export files created by *1-2-3, Symphony, Lotus Agenda, dBase, SideKick*, and *Excel*, as well as DIF, SYLK, and comma-delimited and tab-delimited ASCII files.

The program lets you generate Gantt charts to show the status of any objective, project, or task. You can produce several standard reports, as well as custom reports from a data query using SQL (Structured Query Language). Templates let you update reports and memos.

The program records the original project plans; records subsequent changes to such plan components as employees' hours, project budget, assigned managers, task priorities, and due dates; and notes the date, time, and author of each change.

Runs on the IBM PC, PS/2, and compatible computers with a hard disk and 640K of RAM. $395 for one copy, $595 for a LAN version for two users, various prices to as much as $1,995 for unlimited users per server. From Information Re-

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search, 2421 Ivy Rd., Charlottesville, VA 22901; 800-368-3542.
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OTHER SOFTWARE

@Functions for Science and Engineering

The @Library—Scientific and Engineering Applications is a *1-2-3* and *Symphony* add-in that duplicates the work of a scientific calculator. You can graph the results of your calculations from your worksheet, eliminating the need for a math-graphing package.

The program's statistical @functions include hyperbolic, inverse-hyperbolic, gamma, beta, Bessell, error-checking, Kronecker delta, and more. Other included @functions find the square root of pi and perform matrix algebra, radian-to-degree conversion, and power-series expansion.

Requires *1-2-3* Release 2/2.01 or any release of *Symphony*. Uses 12K of RAM; optional help screens in a separate add-in use 13K of RAM. $79.95, from IRG Information Systems, 100 North Country Rd., Setauket, NY 11733; 516-689-7682.
CIRCLE 11 ON READER SERVICE CARD

Template for Chemical and Petroleum Engineers

CodeCalc Engineering Library is a series of separately sold programs that let you use your worksheet to analyze mechanical-engineering problems related to the chemical and petroleum industries. *AP1650* ($195) helps you design and analyze the structure of welded-steel oil-storage tanks. *Autofret* ($95) lets you analyze stress placed on thick-walled high-pressure vessels during and after autofrettage. *Fullmat* ($95) is a database with all stress-versus-temperature tables from ASME (American Society of Mechanical Engineers) Code, Section VIII. *Rectves* ($145) lets you analyze internal pressure placed on all noncircular vessels using ASME Code, Section VIII, Appendix 13. *Shrinkfit* ($95) lets you analyze interference-fit, temperature, internal-pressure, and spin-load stresses on concentric cylinders. *Tempcyl* ($95) lets you measure temperature distribution and heat flux of a thick cylinder or flat wall with multiple layers. *Thickjnt* ($95) lets you use the Kopp and Sayre method of spring-constant and stress analysis on expansion joints with flanges and flues and evaluate them per ASME code. *Thinjnt* ($95) lets you analyze the stress and life cycle of metal-bellows expansion joints using ASME code, appendix BB.

Each program requires *1-2-3* Release 2/2.01 or *Symphony* Releases 1.1 or higher and 512K of RAM. Programs can exchange data with *CodeCalc* ($495) and *TowerCalc* ($295). From CodeCalc Software, 16516 Sealark, Suite 782, Houston, TX 77062; 713-486-7672.
CIRCLE 12 ON READER SERVICE CARD

Sophisticated Statistics and Graphs for Novices

GB-Stat, from the makers of *Graph-in-the-Box*, lets nonstatisticians import any *1-2-3* or *dBase* file, run 300 statistics routines, and create complex graphs. The program imports and exports PRN, DIF, ASCII, HPGL, and PostScript file formats.

A data-management feature, which helps you prepare your statistical work, includes 50 data transformations to recode data, pick out subsamples, and more. Statistical routines include nonparametric procedures, analysis of variance with equal and unequal sample sizes, simple and multiple regression analysis, multivariate analysis, data distribution, and descriptive analysis.

The program lets you make 11 kinds of charts for presentations, including bar, line, and pie. You can make 16 analytic charts, including spline curves (which connect data points), histograms, and best-fit, min-max, high-low, and error-bar trend graphs.

Runs on the IBM PC, PS/2, and compatible computers with 512K of RAM. Supports most graphics cards, monitors, printers, and math coprocessors. $299.95, from New England Software, Greenwich Office Pk., Greenwich, CT 06831; 203-625-0062.
CIRCLE 13 ON READER SERVICE CARD

HARDWARE

Fax and Modem Combination for Laptop or Desktop

WorldPort 2496 is a portable unit consisting of a fax machine and a 2400-baud modem. It was designed to be used with laptop and portable computers, but it also works with desktop computers. You can run it from a 9-volt battery for 6 to 10 hours, or you can plug it into an AC outlet or connect it to your PC. The unit detects and routes incoming fax and data (modem) calls. If you add an acoustic coupler for an additional $79.95, you can send faxes from places where direct connections aren't available, such as phone booths and hotel rooms.

Included software can run in the background both to send and receive faxes and to send several messages at once. The software stores signatures and logos to add to your faxes, and it has an electronic phonebook for automatic dialing. The program has drivers for Epson, Hewlett-Packard LaserJet, and compatible printers.

The Hayes-compatible modem operates automatically at rates of 300 to 2400 bits per second. It has an internal speaker and four LED indicators. It conforms to United States and international communications standards.

Runs with the IBM PC and compatible laptop, portable, and desktop computers with RS-232 ports, and DOS 2.1 or higher. Manufacturer recommends a hard disk. Uses 300K of RAM when running in the foreground, 93K when running in the background. $699, from Touchbase Systems, 160 Laurel Ave., Northport, NY 11768; 800-541-0345, in N.Y. 516-261-0423.
CIRCLE 14 ON READER SERVICE CARD

Tiny Computer with 1-2-3 and WordStar Connection

The Cambridge Z88 is a one-inch thick, battery-operated computer with built-in software that is compatible with all releases of *1-2-3* and *WordStar*. Some considerations for *1-2-3* users: You can't write macros, use graphics, or use all the @functions. The computer has an 8-line by 120-character display and weighs less than two pounds. The optional IBM *PCLink* ($82) lets you load files into a desktop computer.

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Comes with 32K of RAM and 128K of ROM; additional memory cartridges are available to expand to 1.5 megabytes of memory. $599, from Cambridge Direct,

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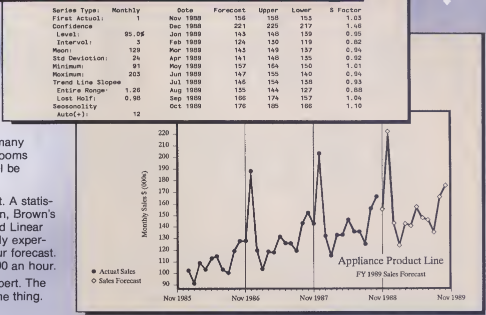

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Series Type:   Monthly        Date      Forecast   Upper   Lower    S Factor
First Actual:        1      Nov 1988       156      158     153       1.03
Confidence                  Dec 1988       221      225     217       1.46
 Level:          95.0%      Jan 1989       143      148     139       0.95
 Interval:           3      Feb 1989       124      130     119       0.82
Mean:              129      Mar 1989       143      149     137       0.94
Std Deviation:      24      Apr 1989       141      148     135       0.92
Minimum:            91      May 1989       157      164     150       1.01
Maximum:           203      Jun 1989       147      155     140       0.94
Trend Line Slopes           Jul 1989       146      154     138       0.93
 Entire Range·    1.26      Aug 1989       135      144     127       0.88
 Last Half:       0.98      Sep 1989       166      174     157       1.04
Seasonality                 Oct 1989       176      185     166       1.10
 Auto(+):           12
```

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CIRCLE 15 ON READER SERVICE CARD

IBM/Mac Black-and-White Overhead-Projection Panel

ViewFrame II + 2 lets you show real-time computer displays on an overhead projector. This helps you conduct interactive training and presentations. The device can magnify the original output from 3 to 20 times and produces 640-pixel by 480-pixel resolution. Eight shades of gray represent screen colors.

ViewFrame II + 2 plugs into the video card of the IBM PC, PS/2, Macintosh II, or compatible computer. An adapter kit ($149) is available for the Macintosh SE and Macintosh Plus.

Requires one of the computers listed above and a transmissive overhead projector, where the light source is not reflected but shines through the panel. $1,850 (includes PS/2, VGA, EGA, CGA, and Mac II adapter cables), from nView Corp., 11835 Canon Blvd., Newport News, VA 23606; 804-873-1354.
CIRCLE 16 ON READER SERVICE CARD

UPGRADES

Turbo EMS is an expanded-memory manager that is 25% faster than its predecessor, *Above Disc*. It lets you use your hard disk or extended memory to provide up to 32 megabytes of expanded memory; *1-2-3* and *Symphony* can use only 4 megabytes of that amount. The program supports the Lotus/Intel/Microsoft Expanded-Memory Specification (LIM-EMS) 4.0, *Lotus Networker*, and local area networks.

Runs with the IBM PC and compatible computers with 256K of RAM. $99.95, from Lantana Technology, 4393 Viewridge Ave., Suite A, San Diego, CA 92123; 619-565-6400.
CIRCLE 17 ON READER SERVICE CARD

BocaRAM/AT Plus memory board lets you fill 512K to 640K of conventional memory and add to '286-based and '386-based PCs as much as 8 megabytes of memory that meets the Lotus/Intel/Microsoft Expanded-Memory Specification. The manufacturer claims you can plug in RAM chips of various speeds, and your PC can perform at zero-wait state. The board is compatible with DOS, OS/2, Unix, and Xenix operating systems and CPUs with speeds of up to 33 megahertz. Software utilities include a RAM disk, a print spooler, and a diagnostics disk. $225 (no additional memory; memory manipulation only), $995 (2 megabytes of memory), $1,795 (4 megabytes of memory), and $3,395 (8 megabytes of memory). From Boca Research, 6401 Congress Ave., Boca Raton, FL 33487; 407-997-6227.
CIRCLE 18 ON READER SERVICE CARD

Agenda for OS/2 lets *Lotus Agenda* run in the IBM OS/2 protected-mode environment. This gives you up to 16 megabytes of addressable RAM, lets you run other applications simultaneously, and allows you to run certain *Agenda* functions in the background.

Runs on the IBM PC AT, PS/2 Models 50 through 80, and compatible computers with 1.5 megabytes of RAM and a hard disk. The product is available only to DOS-based *Agenda* owners for $25, from Lotus Development Corp., P.O. Box 9158, Cambridge, MA 02139-9158; 800-345-1043.
CIRCLE 19 ON READER SERVICE CARD

Lotus Signal Release 2.1 running with *Desqview* Version 2.2 lets you monitor real-time market data in a window while you run another application. You can also run *Signal* in the background and set audio or visual alerts to notify you of price and volume changes of selected stocks. The new release makes it easier to change some or all option expiration dates in your portfolio.

Signal provides open-interest and volume data on futures contracts, which means it now includes all futures data in real time. It also provides open-interest data on index and equity options.

Runs on the IBM PC, PS/2, and compatible computers with 384K of RAM. $595, from Lotus Information Network Corp., 1900 South Norfolk St., San Mateo, CA 94403; 800-367-4670.
CIRCLE 20 ON READER SERVICE CARD

Disk Technician Advanced has removed copy protection. It's now simpler to perform a comprehensive test of your floppy or hard disk and repair or block off bad sectors. The program lets you reformat your hard disk without erasing existing files. It has improved disk-use pattern recognition, which helps anticipate hardware failures. It also lets you select a safe area of your disk (an area with no data) where your hard-disk head can rest when idle in order to prevent damaging your data.

Runs on the IBM PC, PS/2, or compatible computer with 512K of RAM. $189.95, from Prime Solutions, 1940 Garnet Ave., San Diego, CA 92109; 800-847-5000.
CIRCLE 21 ON READER SERVICE CARD

BOOKS

Alfred Glossbrenner's Master Guide to Free Software for IBMs and Compatible Computers, by Alfred Glossbrenner. Published December 1988, 530 pages, $18.95, from St. Martin's Press, 175 Fifth Ave., New York, NY 10010; 212-674-5151.
CIRCLE 22 ON READER SERVICE CARD

PC Care Manual: Diagnosing and Maintaining Your MS-DOS, CP/M, or Macintosh System, by Chris Morrison and Teresa S. Stover. Published March 1988, 224 pages, $16.95, from Tab Books, Blue Ridge Summit, PA 17294-0850; 800-822-8138, in Penn. and Alaska 714-794-2191.
CIRCLE 23 ON READER SERVICE CARD

LaserJet Unlimited, Edition II, by Ted Nace and Michael Gardner. Covers printing with software such as *1-2-3, WordPerfect* Version 5.0, *dBase III Plus* and *dBase IV, Microsoft Word* Version 4.0, *Microsoft Windows, PageMaker* Version 3.0, and *Ventura Publisher*. Published October 1988, 544 pages, $24.95, from Peachpit Press, 1085 Keith Ave., Berkeley, CA 94708; 415-527-8555.
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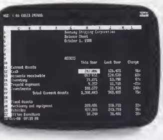

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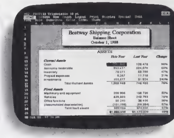

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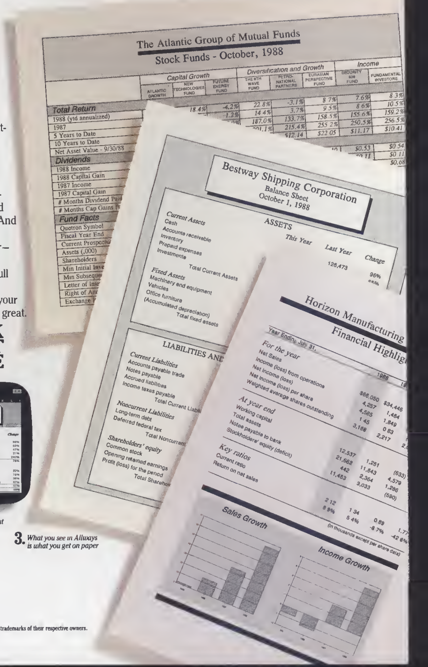

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CIRCLE 109 ON READER SERVICE CARD

WHY I KEEP BUYING COMPUTER BOOKS

BY DANIEL SELIGMAN

DAVID GOLDIN

The explosion of personal-computer books has astonished the publishing world. It has also confounded millions of characters like your essayist, who now finds himself compulsively buying more PC books than "real" books—the kind a reasonable person sits down and reads from front to back.

I own PC books that have never been opened. Accusatorily sitting there on the bookshelf, for example, is *Macros, Menus and Miracles for Lotus 1-2-3*, by E. Michael Lunsford (John Wiley and Sons, 1987). I paid $22.95 for this product and do not doubt that it is first-rate. One of these days, though probably not today, I plan to master its contents or at least get on top of one decent miracle.

Like a lot of people, I also guiltily possess a certain number of unopened real books, the latest example being Stephen Hawking's *A Brief History of Time: From the Big Bang to Black Holes* (Bantam Books, 1988). But somehow I feel more relaxed about putting off Hawking than Lunsford. Like all PC books, Mike's is growing obsolete with every day that passes. If I am reading the reviewers correctly, Hawking's thoughts could be valid for a billion years.

Most of my PC books get used, however, and some get used a lot. I slid into heavy usage almost as soon as I got my hands on a PC in 1984. It seemed important at the time to learn BASIC, and I discovered fairly rapidly that no single book could straighten things out for me. Today I own 13 books on BASIC.

But, of course, BASIC still takes up less of my bookshelf, not to mention B. Dalton's, than do the various outpourings on applications software. Everybody knows how this business—the books on word processing, spreadsheets, and databases—got started. It started because the documentation was god-awful.

When I got into word-processing, I began with *XyWrite*, as did a lot of my colleagues at Time Inc. But the documentation for early versions of *XyWrite* could cause grown men to cry. I remember a week in which a colleague and I spent hours trying to figure out how to put page numbers where they belonged.

Footnote to the above: The documentation that comes with the latest version (*XyWrite III Plus*) is a model of lucidity. On the other hand, there is a dismaying amount of it. When I have a *XyWrite* question, I am often unsure whether to reach for the 660-page loose-leaf *Reference Guide*, the 140-page *Applications Tutorial*, or the 215-page *Basic Word Processing Tutorial*. I often skip them all and turn to *Using XyWrite III*, by John Sladek (Osborne/McGraw-Hill, 1987), which is less comprehensive but usually solves my problem.

When I was a boy, it was said that more books had been written about Napoleon than about any other single subject. I assume that Bonaparte has long since been left in the dust by Hitler and *1-2-3*. That's a joke, I think. But there is no doubt that if applications software is a publishing bonanza, then *1-2-3* is the mother lode. It has generated an avalanche of books, even though the current documentation (for Release 2.01) is first-rate and not excessively cumbersome. Who needs all those books?

Part of the answer is that a lot of people need the books because they do not have access to the documentation; they are using pirated stuff. Another part of the answer is that spreadsheets, like software in general, are sufficiently confusing that it is truly helpful to get the perspectives of more than one author. And software-book publishers have the huge advantage of being able to study and think about a finished product. By contrast, the documentation folks were going nuts frantically rewriting the story about a product that kept changing right up to the press date.

My own model of a truly superior *1-2-3* guide is *Douglas Cobb's 1-2-3 Handbook* (The Cobb Group, 1986). Possibly this is because Cobb grew up in a liberal arts environment—10 years ago he was a political science major at Williams College—far from the inbred world of professional programmers. I gather that The Cobb Group's writers (there are now eight) tend to come from similar backgrounds. Like Cobb himself, they are all self-taught.

It struck me that Cobb had made basically the same strategic decision about writers that Henry Luce made when he founded *Fortune* in 1930. At the time, there was no such thing as a "business writer." So how would he staff the magazine? Luce decided to take real writers and teach them about business, not to take business experts and try to make writers out of them (which would have been a disaster). If you're producing a book, it always pays to have a real writer on hand. Even if it's not a "real" book. ■

Daniel Seligman writes Fortune *magazine's "Keeping Up" column.*

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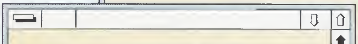

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